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Issue 117 • 2nd February 1991 • 70p

NEW COMPUTER EXPRESS

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THIS WEEK

AMIGA
The A500 Professional is now shipping in the US - but will it be worth upgrading when it arrives here?

ATARI
Ripper - is this the ultimate cracking cartridge?

PC
Now you can watch live TV while working with Windows

MACINTOSH
New 68040 Mac announced

CPC
Dazzlingly Mystical graphics!

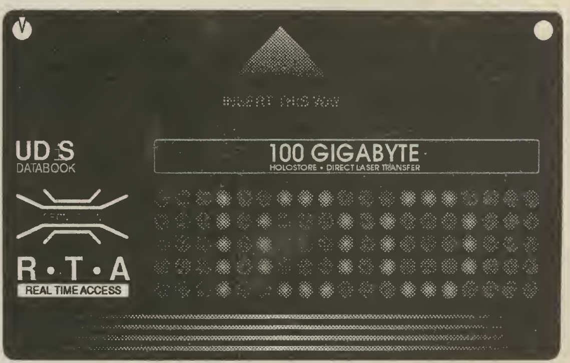
HITACHI'S HI-TECH VISIONS REVEALED

AMIGA CDTV ONLY £365!

Why Commodore must give you the bargain you never thought possible - see page 7

FUTURE DISPLAYS

How can your Amiga show 16 million colours at once?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HOLOSTORE • DIRECT LASER TRANSFER
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REAL TIME ACCESS

FUTURE STORAGE

Why one of these could replace disks, videos & CDs

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JUST BOUGHT AN AMIGA OR ST?

ALL YOU NEED TO KNOW ABOUT DTP & GRAPHICS

frontend

edited by Colin Campbell

KICK OFF WORLD CUP PLANNED

EXCLUSIVE

The Computer Football Association is planning to launch a *Kick Off* World Cup within the next two years, *Express* can reveal.

The tournament will be funded by entrants and will include players from most Western European countries as well as *Kick Off* fans from North America, Australia and the Far East.

CFA, the London based organising body, says it has already enlisted help from similar organisations in France, Italy, Germany, Holland, Sweden, Spain, Ireland, Belgium and Norway. It is hoped that links can be made with *Kick Off* fans in the USA, Australia and Japan.

The first *Kick Off* championships were held in London at the *Computer Shopper* Show late last year. Some 5,000 players entered the British competition which was won in extra time by Neal Type of Brighton. He went on to enter a mini European Championship attended by representatives from France, Germany and Italy – Luca Caldiero of Italy beat the German competitor in the final.

Kick Off's publisher Anco stumped up the prize money for both finals although the CFA was central to the competition's organisation.

CFA chairman Steve Anderson commented: "It's something I've been thinking on very seriously. The enthusiasm for the game is definitely there, but we have to make it commercially viable."

Another British championship is planned for 1991 – players will be invited along to 16 regional centres from which the winners will be entered into a final tournament. Again, the winner of that will be Britain's representative in any grander competition. ▒

Airport laptop crackdown

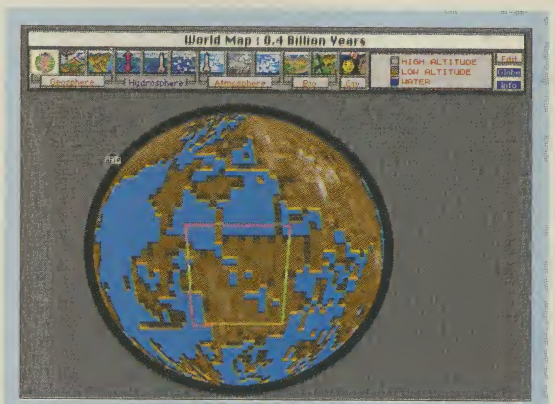
Thinking of taking the laptop on that holiday abroad this summer? Then forget it.

That's the message from British Airways, which has announced strict new security provisions in order to deal with the increasing threat of terrorism.

BA is warning customers to avoid travelling with electrical equipment, but portable computers will come under extra scrutiny. A spokeswoman explained: "Travel with the absolute minimum of electrical items. If you must take a portable computer on your flight be aware that you must declare it to both the airline and to airport security staff.

"Not only will you need to prove that it works – by turning it on – but it may well be taken apart for closer examination."

Putting the portable back together again will be up to the owner, and it's not an easy job. Also, BA will want to check that it works – if it does there's less chance that it's stuffed with Semtex. ▒



What on Earth?

In a week's time Ocean is expected to launch *Sim Earth* – the largest project yet to be undertaken by Europe's biggest entertainment software publisher.

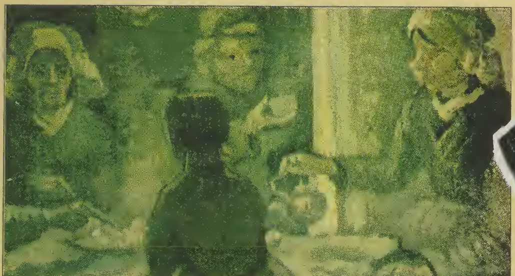
Gaming's leading lights are already debating its worth – is it an exercise in megahype or is it the software event of the year? The smart money is going on the latter.

***Sim Earth* works in much the same fashion as its predecessor *Sim City*, but instead of nurturing a town, it's up to you to develop life on planet Earth. You can join evolution at pretty much any stage, but the number of variants controlling development run into the hundreds.**

Ocean says the game all laid out for ease of use as well as sophistication. *Sim Earth* will be out on the PC, ST, Amiga and Mac with a price tag of £39.95.

***Express* will be carrying a full review...** ■

ART THIEVES BEWARE



A computer logging system has been launched in an effort to squash the £250 million a year trade in stolen works of art.

The New York based International Foundation for Art Research estimates that only ten per cent of stolen works are recovered. But it is hoped that a dedicated computer network will increase this dismal recovery rate.

The system, called Art Loss Register, contains pictures of 6,000 logged items along with salient details on the works and their theft. Dealers with computer terminals can log onto the computer to check if an offered painting or sculpture is stolen property.

Works on the database include Van Gogh's The Potato Eaters (pictured) as well as paintings by Picasso and others. ■

Karaoke Casio

An electronic piano with built in interactive CD will be the centrepiece of Casio's stand at the Frankfurt Music Fair.

The AP-7 offers a 5, 700 event sequencer, ROM/RAM memory port, and a CD that can be linked to sequencer data for interactive CD work.

As well as interactive CDs, the AP-7 can be used to accompany any music CD and a microphone input allows the player to sing along to the accompaniment. A full set of performance controls including reverb, chorus, pan and brilliance are added to the MIDI capability to make the AP-7 the most innovative piano since the Clavinova.

As well as the AP-7 there will be ten new keyboards on Casio's stand including four full sized keyboards, and several mini keyboards. Casio is on 081-450 9131. ▒

WHEN THE GOING GETS TOUGH

Computers were not made to be chucked against brick walls, nor were they designed to be locked in freezers. At least, that's the commonly held view.

Those lovable Swedish folk have a slightly different perception on the matter. They like putting computers through the "normal" rough and tumble of everyday life, and in way of demonstration, they've launched a PC which can take this treatment and worse.

The Tough Guy 386 was launched here last week courtesy of Dynabook. It is designed to run continuously for five years and is "dust proof, vibration proof, sound proof and even proofed against being dropped onto a concrete floor from a height of 70cm".

The Swedes apparently put the machine through all manner of tests before launch. At one stage an electric charge of 500 Kilovolts was blasted into the poor computer – but without any harmful effect. And Tough Guy still worked perfectly in a very very cold storeroom.

The Dynabook 386HP is a 25MHz machine that comes tooled up with 4Mb of RAM. There are eight available expansion slots, parallel and serial ports and hard disk from 40Mb upwards. Apart from its rugged nature, it can also thwart computer snoopers through low radiation output.

A spokeswoman for Dynabook said the machine would be ideal for any place where things get rough. If you're a sensible computer user (or even a destructive maniac) with £4,749 going spare, dial 0628 473363. ■

Hedgehog to squash Mario?

Sega has announced that it is working on a new video game which, it claims, will dislodge Mario from his position as computer character supremo.

Sonic Hedgehog **– due for a Megadrive debut in the summer – is being described as "the last word in platform adventures" by American journalists. One went so far as to call it "bigger and better than *Mario*".**

It seems that the game is faster and more colourful than Nintendo's pride and joy *Mario 3*, and even cuter than the unbearably gooey *New Zealand Story*.

Also, Sega is understood to be planning a coin-op version and a licence deal which will mean the emergence of this hedgehog on home computer formats. ■

MP calls for computer law change

• Roy: worried.

Shadow Home Secretary Roy Hattersley has committed the Labour Party to a full review of the beleaguered Data Protection Act. The Opposition says there are too many loopholes in the six-year-old law.

Hattersley commented: "The Labour Party will establish an individual's right to prohibit or restrict the collection of personal information." The Home Affairs Committee has criticised the act's failure to clean up those companies which deal in third party information.

Fears are growing that companies can wriggle out of enforcement notices by making special appeals. Four large credit agencies have already been served enforcement notices based on their insistence on holding files based on addresses. However, one of the agencies (CNN) is appealing – many suspect the firm will succeed.

Labour MP Harry Cohen said that the act "needs tightening up" and that "there is a long way to go". The Data Registrar Eric Howe agreed that the act should prohibit organisations from collecting irrelevant information on individuals. ■

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Some of the remarkable technology which the Japanese have in store for the 21st Century – page 14

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ELECTRONIC

E-mail was deemed to be the future of personal communications. But with the demise of Microlink, does this still hold true? Steve Gold scrolls through the competitors to see how they're surviving.

Since its early beginnings in the late 1970s in the UK, the electronic mail market place has come on by leaps and bounds. 1979 saw the introduction of the then fledgling Prestel viewdata market, but it was not until 1983 when another of British Telecom's divisions rolled out Telecom Gold, BT's first electronic mail (E-mail) service, that E-mail came of age.

Today, Telecom Gold has around 150,000 subscribers, with Prestel bringing up a close second with over 120,000 subscribers. Because the services are now managed by the same BT division in Hemel Hempstead (BT Managed Network Services) there has been a degree of interplay between them this past few years. The result has been that, while Prestel used to be considered an information system with an E-mail facility grafted on, and Telecom Gold was considered an E-mail network with information services bolted on, both services now encroach on each other's market attractions.

> // Prestel is geared very much at specific markets. Telecom Gold, in contrast, is billed as a universal E-mail service//

The key difference between Prestel and Telecom Gold lies, however, in their respective charging structure and user interface. Prestel is geared very much at specific markets – i.e. travel agents, business people and home micro enthusiasts, who have their own respective areas on the service. Prestel also has a quirky coloured display that is 40 characters across and 22 lines deep. As each screen of data is displayed, the cursor clears the preceding page of data from the screen.

Telecom Gold, in contrast, is billed as a universal E-mail service. Using a scrolling ASCII format, the service has onward access to a number of third-party systems – both by gateway for information services – as well as via an intermail facility to other linked E-mail networks around the world.

Telecom Gold's success lies in the fact that BT liked the service so much that in the late 1980's it bought the US company, Dialcom, which developed the system software. Today there are Dialcom-link E-mail networks around the world, and Telecom Gold subscribers can exchange E-mail with subscribers to those systems for a modest fee.

Prestel's charges vary, depending on what class of customer you are. Residential subscribers fare the best, paying just £8 a quarter to access the service, plus seven pence a minute during office hours and one pence a minute at off-peak times. Business subscribers pay £18 a quarter for a subscription, plus the same 7p/1p a minute charges as residential subscribers. Depending on what closed user group (CUG) services you pay for on Prestel, you also get periods of free access during which, provided you stay in certain areas (e.g. Micronet for home computer users) no time fees are incurred – other than a local call to your nearest Prestel access port.

Telecom Gold, in contrast, charges subscribers £10 to sign up, and £5 a month on-going subscription. On-line charges vary, based on the time of day the service is accessed, and how much data is transmitted and received. As a rough rule of thumb, peak rate access to Telecom Gold is around 20 pence a minute, and five pence a minute at off-peak times.

There is also a charge for accessing Telecom Gold from outside the local calling area of London. Subscribers can either elect to call the main system ports in London – and pay standard connect rates – or dial their nearest BT packet data network (PDN) port to access the service for around three pence a minute extra.

Telecom Gold is not unusual in this respect. Prestel is the real exception, since its users are fairly cost-conscious, having enjoyed cheap access facilities since the late '70s. Telecom Gold is lucky, having been able to reply on other BT data – such as PSS and Dial Plus, the two PDN dial-up services – to allow its subscribers to place local calls at minimal surcharges.

Other E-mail services have not been so lucky. Microlink, the E-mail service run by AT&T Istel, had to reply on the Istel packet data network to allow its subscribers to log on outside of London. Istel's network was designed for low-speed access by travel agents, and not for data-hungry E-mail users. The result has been that subscribers have been less than happy with Microlink, which closes at the end of February with around 3,000 remaining subscribers.

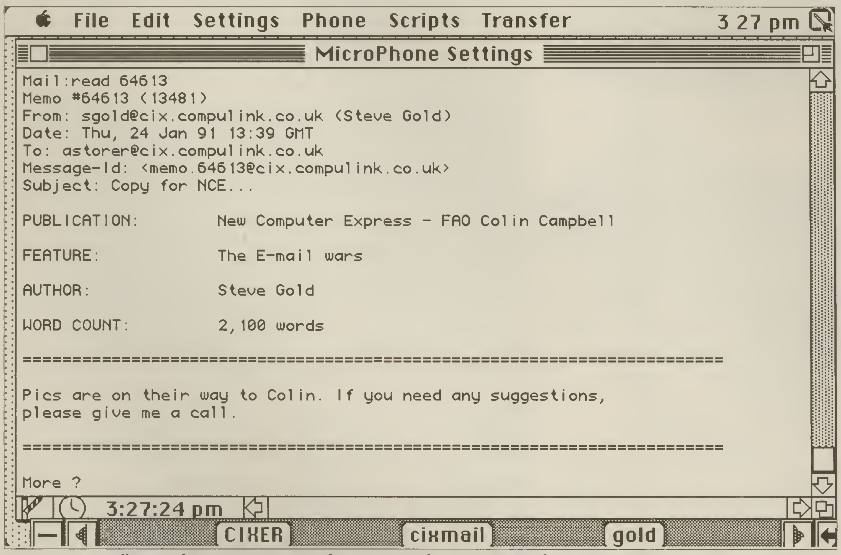
> // Cix, Compuserve and The Direct Connection have all been doing quite well out of Microlink's decision to close//

Microlink was, in fact, launched in the mid-80s by Database, publisher of a range of computer magazines, as a sub-set of Telecom Gold. At the time, Telecom Gold was concentrating on signing up business subscribers, and so residential and small users of the service found themselves at Microlink's door to get a free or reduced rate sign-up to Telecom Gold.

Microlink was run on Telecom Gold's computers as a club service. This meant that, although subscribers had the facility to send and receive E-mail with other users of Telecom Gold, as well as Dialcom-linked services around the world, they were cocooned in the Microlink menuing system.

In late '89, Microlink moved to AT&T Istel's computer system and network, after which time Database's involvement slipped into the background. While an intermail service to and from Telecom Gold was available, it was expensive and unreliable. Added to that, Telecom Gold was unhappy about inter-system E-mail outside of the Dialcom empire, so the gateway was shut down after a short time. For many subscribers, this was the final straw, so they migrated to other systems, including Telecom Gold and the variety of alternative systems that have sprung up this past few years.

These other systems, despite the lack of ready access to alternative PDN services to allow easy access for subscribers outside of London, have thrived in their own way. While none of them allow ready interchange of E-mail with Telecom Gold subscribers (BT clamped down on intermail facilities on Telecom Gold since the Microlink problem) they readily compensate in



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Mail:read 64613
Memo #64613 (13481)
From: sgold@cix.compulink.co.uk (Steve Gold)
Date: Thu, 24 Jan 91 13:39 GMT
To: astorer@cix.compulink.co.uk
Message-Id: <memo.64613@cix.compulink.co.uk>
Subject: Copy for NCE...

PUBLICATION:          New Computer Express - FAO Colin Campbell

FEATURE:              The E-mail wars

AUTHOR:               Steve Gold

WORD COUNT:           2,100 words

================================================================

Pics are on their way to Colin. If you need any suggestions,
please give me a call.

================================================================

More ?
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• *Cix – essentially a conferencing system with a capacity of up to 128 simultaneous users.*

E-MAIL NUMBERS

Cix	081-399-5252 (data - 8:N:1) 081-390-8446 (voice)
Compuserve	0800-289-458
Prestel & Telecom Gold	0800-200-700
The Direct Connection	081-853-3965 (data – 8:N:1) 081-853-2283 (voice)

File
Edit
Settings
Phone
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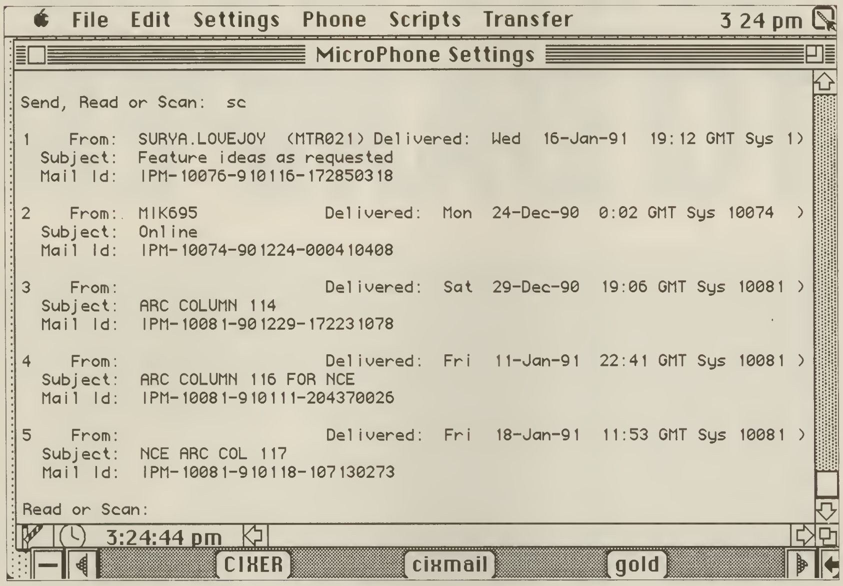
MAIL WARS



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Send, Read or Scan:  sc

1    From:   SURYA.LOVEJOY  (MTR021) Delivered:  Wed  16-Jan-91  19:12 GMT Sys 1)
  Subject:   Feature ideas as requested
  Mail Id:   IPM-10076-910116-17285031 8

2    From:.  MIK695                Delivered:  Mon  24-Dec-90  0:02 GMT Sys 10074  )
  Subject:   Online
  Mail Id:   IPM-10074-901224-00041 0408

3    From:                         Delivered:  Sat  29-Dec-90  19:06 GMT Sys 10081 )
  Subject:   ARC COLUMN 114
  Mail Id:   IPM-10081-901229-17223 1078

4    From:                         Delivered:  Fri  11-Jan-91  22:41 GMT Sys 10081 )
  Subject:   ARC COLUMN 116 FOR NCE
  Mail Id:   IPM-10081-910111-204370026

5    From:                         Delivered:  Fri  18-Jan-91  11:53 GMT Sys 10081 )
  Subject:   NCE ARC COL 117
  Mail Id:   IPM-10081-910118-107130273

Read or Scan:
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• Telecom Gold – at the forefront of intermail service.

other areas.

Before looking at other E-mail services, a word here on Telecom Gold's policy towards inter-system E-mail. The past few years have seen Telecom Gold at the forefront of introducing a service known as X.400 intermail. The X.400 standard was agreed by the CCITT international telecoms regulatory body two years ago. The standard calls for a simple but effective data format for all E-mail systems, so allowing easy transmission between systems around the world.

While US services such as Compuserve and MCI Mail have implemented the X.400 standard on a freely available basis – so allowing, for example, an MCI subscriber to easily exchange E-mail with a Compuserve user – Telecom Gold has set up an exclusive set of mailboxes on a private MHS (message handling service) computer, membership which costs £700 plus a minimum monthly billing of £100. In theory, a subscriber on MCI Mail, or any other X.400-compatible service, can send an E-mail to any Telecom Gold mailbox. This facility is available to all non-UK Dialcom networks – Telecom Gold requires such E-mails to be routed through its MHS computer system. There, if the recipient has not paid for MHS access, the E-mail is `bounced' and returned to its source. An incredible situation and one that several parties are taking up with Telecom Gold as you read this feature.

Back in the real world, meanwhile, and three on-line services have been doing quite well out of Microlink's decision to close its service at the end of February. These services are: Cix, Compuserve and The Direct Connection. All three services are connected to Usenet, a loosely-linked consortium of on-line systems around the world which allow mail to be exchanged between their respective systems using a store and forwarding technique. This means that, though E-mail and files are routed via several host networks and can take up to a day to arrive (especially where transatlantic routing is involved) it is routed at very low cost – typically 3.5 pence per 1,000 characters for even the most round-the-world routes.

Cix is the Compulink Information eXchange and is based in Surbiton, Surrey. The system has the capacity for up to 128 simultaneous users and can be accessed at all modem speeds to 9,600 bits per second, as well as via the BT PSS and Dial Plus services, subject to subscription to the PSS or Dial Plus networks. Cixis, essentially, a conferencing system, allowing subscribers to converse via a series of bulletin boards and CB-style services. Email is available between CIX subscribers and, of course, via the Usenet service.

Cix costs £15 to sign up, and then £3-10 an hour in office times, and £2 an hour at off-peak times, regardless of the speed the service is accessed. A minimum monthly bill — charged to a credit card or your bank account – costs £6.50 plus VAT.

Compuserve, in contrast, is based in Columbus, Ohio, in the US. Launched in the late '70s in the US, the service now claims to have 600,000 subscribers around the world. Via a representative office in Bristol, the service can currently be subscribed to for $19.95 start-up fees, which includes $15 worth of free access plus a copy of the *Compuserve Information Manager*, a comms package for the PC or Apple Mac computers. This offer of a free copy of the Compuserve Information Manager is for a limited time only. Compuserve has an astonishing habit of chopping and changing its mind on such offers, so, if you are considering taking up the special offer, be prepared to move quickly.

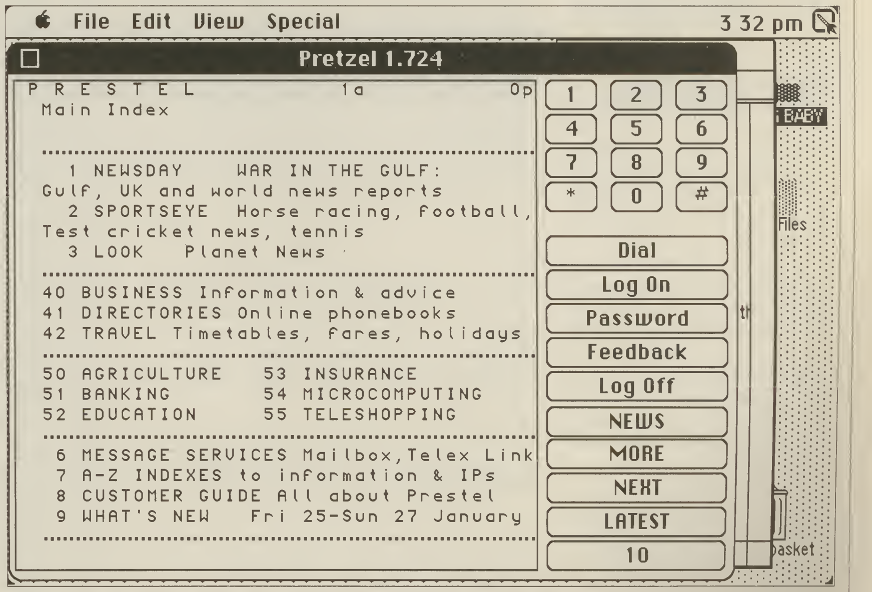
On-line usage on Compuserve is billed in dollars from the US. Dialling direct to a special London access port – available at all speeds to 2400 bps – costs $20.50 an hour during office hours, and $12.80 an hour at off-peak times. Non-London subscribers can access the service on a special reverse-charge basis (no notice is necessary) on the BT Dial Plus service. Access times are based on the time in London. Dial Plus access costs $20.50 an hour at peak times and $17.00 an hour at off-peak times. It's also possible to access the service across the world at similar rates. In the US, for example, Compuserve costs $12.80 an hour to use.

Compuserve is a giant US on-line service. As well as the obligatory E-mail facilities, subscribers can send and receive telex messages, as well as send fax items on an E-mail to fax basis. Charges are very reasonable. Compuserve's attraction is that it is American and thus allows ready access – and a degree of information interchange – with the US culture. Gigabytes of data, ranging from text files to whole programs, are available for download. The service is, in many ways, the universal on-line panacea – at a cost.

For those modem users on a tight budget, The Direct Connection (TDC) in London provides an alternative. For £5 sign-up fee and £10 a month flat rate, subscribers can call the service's London number, accessible at all modem speeds to 2,400 bps, and use the service E-mail and fax facilities to their heart's content. Since access to Usenet intermail facilities is available, there are no problems in giving a mailbox on TDC in preference, say, to Microlink. TDC is not currently available via PDN services outside of London, but long-term plans are in hand on this matter. In any event, the flat-rate usage charges more than compensate for this slight snag for out-of-towners.

E-mail is only good as long as the recipient is accessible via your chosen E-mail service. This situation mirrors that with the telephone in the middle of the last century: users had to be on several competing services in order to be able to receive calls from all users of the telephone. The Usenet network solves a number of problems in this direction and, subject to a delay of a few hours on inter-system E-mail within the UK, it's possible to exchange E-mail with a surprising variety of on-line services with a minimum of fuss.

In many ways, the closure of Microlink will not surprise the remaining 3,000 subscribers to the service – the lack of an intermail gateway to Telecom Gold and the problems with accessing the Istel network have reduced the service's numbers considerably over the past year or so. Istel is to be applauded, however, in arranging for its subscribers to transfer to Compuserve on special terms. The beginning of the year saw the service shuffling its on-line rates downward in the UK – let's hope the gamble pays off. ■



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   8 CUSTOMER GUIDE All about Prestel
   9 WHAT'S NEW   Fri 25-Sun 27 January
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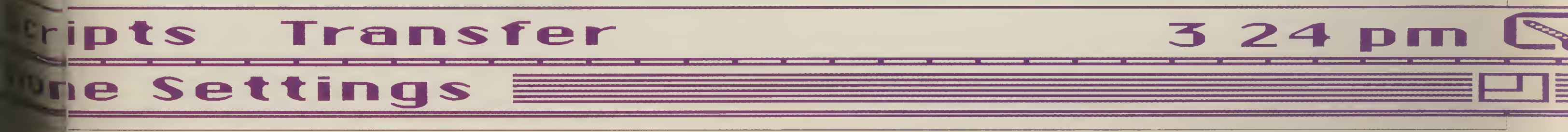
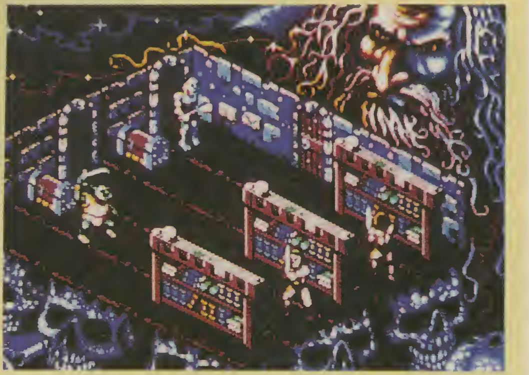
• Prestel – close second in subscription numbers with 120,000 using the service.





• HeroQuest *sets out to dwarf other wizard computer games.*

Quest on time

For some strange reason there are no goblins involved in the eagerly awaited release of *HeroQuest* the computer game from Gremlin.

You do get heaps of elves, dozens of dwarves, battalions of barbarians and of course, wizards. And you get to battle the forces of darkness, search for hidden treasure and become embroiled in intrigues.

The computer version, based on the best selling board game of 1989 also features animated combat sequences, choice of characters and the ability to load and save your chosen guise. All of this takes you towards attaining the rank of hero.

HeroQuest is as yet unpriced and is on course for an Easter release. ■

Windows goes 32-bit

Microsoft is planning to launch a 32-bit version of Windows for 386 and 486-based machines.

The new version, known internally at Microsoft as Win32 will incorporate the graphical interface of Windows 3 with the enhanced multi-tasking and networking capabilities of the more sophisticated environment.

Microsoft is planning to offer a software development kit for 32-bit Windows by mid 1991 with a full release scheduled for early 1992. ▨

Earnings down 97 per cent • £100 CDTV

CBM PROFITS
TO DAMPEN

Following the conformation of disastrous sales figures for 1990, and yet another senior management reshuffle, Commodore has pledged that it will press ahead with the launch of its CDTV. The firm has also hinted at bold initiatives designed to offer CDTV at attractive prices.

A special CDTV add-on offer will be made to current Amiga owners, enabling them to upgrade to CDTV for relatively little expense. And a pre-launch £100 price cut is being prepared for the main unit, bringing the launch price down to £599.

On-line service Newsbytes claims the Californian company flatly refused to reveal its 1990 financial results, but Commodore vice president of finance Ron Alexander's office confirmed published reports that the company had suffered an appalling 97 per cent slump in earnings – down to a feeble $1.5 million. Against this background, Commodore is considering radical remedies to recover lost ground.

Harold Cooperman has been replaced by the hitherto little known James Dionne as CBM president. Dionne moves up from his previous position as head of the Canadian operation. Cooperman has been reassigned as 'vice president Commodore International'.

Commodore says it is still confident that the March launch of CDTV will go ahead. A spokesman for Commodore in the UK confirmed that a CD drive will be launched here in the spring. Called the A690 the player will turn your Amiga into a CDTV machine. A surprisingly low price of £365 is being planned making it the cheapest CD drive on the market by £35.

"We're not going to see this for a few months," offered the spokesman, "but it's going to be a very important product for us and for the whole market. In effect the CD will allow A500 owners to emulate CDTV."

Commodore's much heralded CDTV (Commodore Dynamic Total Vision) allows you to access masses of interactive information held on Compact Discs. Developers can therefore produce much larger and better programs, including games. Without doubt it is Commodore's biggest product since the Amiga launch and, arguably, since the firm was founded in the mid 1950s.

The A690 is unlikely to be a hugely profitable exercise for Commodore, the company will be looking to set up an almost instant user base of CDTV owners. Its biggest problem at the moment is persuading high street stores such as Dixons and Rumbelows to stock CDTV. They will be convinced if they are presented with plans for a quickly established user base.

Japs look to Europe for games

Four top European software houses are set to produce games for the massive-selling Japanese 16-bit games console the TurboGrafx from NEC.

Psygnosis, Gremlin, Hewson and Loriciel have all signed licensing deals with NEC, it was revealed at the recent Las Vegas CES. The Japanese company claims to have scoured around the planet for the best possible games for conversion, and believes it found them in the UK and France.

The titles, which are due in the autumn, are *Ballistix* and *Shadow of the Beast* from Pysgnosis, *Impossamole* from Gremlin, *Panza Kick Boxing* and *Tennis Cup* from Loriciel and *Paradroid '90* from Hewson.

The TurboGrafx has sold some 3.25 million units world wide and has a huge 30 per cent share of the super console market in the US. NEC hopes that this deal will give the console a major boost. ▨

Classic earnings

The Mac Classic and other new Apple Computer launches have helped to provide the American company with 33 per cent net earnings rise since the first quarter of last year.

According to Apple chairman John Sculley: "The new products we introduced, the Mac Classic, Macintosh IIsi and the LC, have been extremely well received offering the computers people want at more affordable prices is clearly working."

The launch of the cheaper Macs onto a hungry market has lead to a 50 per cent rise in shipping. Revenues for the the company were up to $1.676 billion from $1.493 billion.

Linking this demand, and the ability of Apple Computers to supply, combined with new European retail agreements (see *Express* 114) bodes well for users and prospective users of the products over the next year. ▨

Graduates hard hit

Large computer employers are cutting back on recruitment, and graduates look like being the hardest hit.

Last year IBM employed more than 200 graduates, but is not recruiting any this year. ICL is recruiting 260 graduates this year compared with 300 in 1990.

Peter Forbes, ICL's human resources manager. said: "We can be more selective than before because of the over supply of graduates this year." ▨

Expanding SAM

SAM Computers has launched three new peripherals for upgrading and expanding the SAM Coupé.

The 1Mb external memory pack at £79.95 gives the Coupé 1.5Mb and if you feel the need for masses of memory up to four of them can be attached, giving 4.5Mb.

With MasterDOS (£14.95) Coupé users will have access to several MSDOS-like functions. They will be able to create root directories so that different kinds of files, such as games, word processing documents and such can be stored in separate areas. MasterDOS can handle over 700 files.

In conjunction with the expanded memory MasterDOS can be used to set up a RAM disk, which will allow for instant loading on the Coupé.

The SAMBUS (£49.95) is a Coupé expansion connector with which up to four interfaces can be added simultaneously to the computer in one neat plastic case. It is fully buffered so that all the interfaces will work together. An optional extra power supply unit available for £19.95 if any of the add-ons are exceptionally power-hungry.

For further information SAM Computers can be contacted on 0792 700300. ■

• Coupé: new peripherals.

/ price cuts • Cheap CD Amiga upgrade

S SLUMP FAILS CDTV HOPES

Commodore
INTERACTIVE GRAPHICS PLAYER
VOLUME (PHONES LEVEL)
▼DOWN
UP▲
CDTV
AM
VOL
CD/TV
POWER
ON/OFF

• *CDTV: lots of activity despite Commodore's problems.*

The £100 price cut will also make a great deal of difference to retailers and, more importantly, to prospective buyers. We understand that the machine will be launched with a number of free CD titles although exact details of the bundle have yet to be finalised.

In the UK, Commodore expects to sell 50,000 units between the March launch and Christmas. But it is in 1992 that the company plans to really make its mark.

Even so, these grand plans shrink against the backdrop of internal adjustments and unsteady financial performance. In Europe the company is enjoying a success not experienced since the heyday of the C64 in 1983. Amiga sales are rocketing here, but in America the company has still to reap the benefits of renewed interest in the machine.

These are troublesome days for Commodore. If, for some reason, CDTV does fail to materialise, it will be a disaster which the firm will have difficulty overcoming. ▨

DFI
MOUSE
DMS-400
B
DFI
MOUSE
DFI
MO
DMS

High tech mouse

The DMS-400 is a high resolution, top quality PC mouse aimed at designers, so don't be put off by the 'made in Taiwan' tag.

Manufactured by DFI (Diamond Flower Inc) the mouse can be set to a fixed resolution of 400 dots per inch (dpi) or switched to adjust automatically between 130 dpi and 800 dpi depending on how fast the mouse is moving. The high resolution is the result of an advanced opto-mechanical control mechanism designed by DFI.

The DMS-4000 can operate as either a Microsoft or Mouse Systems mouse in left or right-handed modes. It comes with software for mouse control for systems with no built -in mouse support.

It retails for £39 and optional accessories include a mouse pad, a mouse pocket and *BitPaint* graphics software. DFI can be contacted on 081-461 2322. ■

Database stops nasty spell

Education secretary Kenneth Clarke's announcement that bad spellers would lose five per cent of their marks in this summer's GSCE exams has given Database Software an excellent angle for its new spelling program.

Called *Spell*, the program has a 5,000 word vocabulary and is targeted at the five to 15-year-old age group.

Spell was devised by Peter Davidson, a former head of computing at a Manchester comprehensive school. Its programming team was lead by Chris Price who also authored Database's successful *Fun School* series.

The program contains five different modules which are aimed at improving spelling. One of the modules has a space rocket which is launched when a word is spelt correctly.

Priced at £8.95, it runs on six popular micros including the BBC, Archimedes and Amiga. Call 0625 878888. ▨

Talking phone numbers

StarTalker is a new half-length card for 286 and better, PCs which turns your machine into a telephone answering service.

The card uses an 80286 chip and comes with a 7K memory resident program and library of C routines which enables you to carry out a number of voice-phone applications. Among these is the ability to allow callers to select information or products from 'voice menus' – the selections can then be faxed automatically to them.

Another addition is the ability to call a "leading financial database" and have information relayed back in recorded human speech rather than 'computer-speak'.

StarTalker costs £800 and will be available in March. For more information call 0202 813141. ▨

Balloon flight to Pisa

• *Having loaded images from various files* Cameo Image *is here rescaling and rearranging them.*

The all-in-one picture package

Cameo Image is a new British-designed picture processing package which can combine, translate and manipulate graphics from various formats.

Running on the PC, the program supports most of the major graphics file formats, including PCX, TIFF and TIGA. It will input files, process, translate and export them on to a screen or other peripherals and software. Processing functions include cropping, scaling, rotating, mirroring and turning 16-bit images into 8-bit ones. It can also combine various images even if they have been created in different file formats.

Cameo Image can also be used for controlling most of the leading colour scanners, including the Sharp A4 and A3 and the Howtek Scanmaster, and printers including Canon, LaserJet and PaintJet.

UK manufacturer Noble Campion reckons that the package "removes the need to use two or three other graphics programs." The company can be contacted on 081-951 3717. ■

Mario Bros help line

Why bother slogging your, or rather Mario's, guts out when you get stuck on level three of *Super Mario Brothers* when you can pick up a phone and get professional help?

Nintendo's representative in the UK, Bandai, has set up a permanent crew of six keen games players who can been called up from 12 noon until 8pm to give official tips on NES and Game Boy games.

This plan follows along the lines of Nintendo's American operation where 400 such 'counsellors' took eight million calls in 1989. The operation is professionally run and all the counsellors are said to be skilled in games as diverse as *Batman*, *Teenage Mutant Ninja/Hero Turtles* and of course *Super Mario Brothers*.

Jayne Shipperly of Bandai commented: "At the rate calls are coming in, I've no doubt we'll need to increase the number of counsellors in the months to come".

Mario was not available for comment. ▨

Acorn Archimedes mega giveaway

Acorn was in celebratory mood last week after passing the 100,000 sales mark for its Archimedes range of computers.

The magical figure was passed just in time for the crucial computers in education show BETT '91. Most Acorn machines are sold into British schools although the cheaper A3000 range has found favour among computer literate home users.

Acorn was so pleased with itself that an Archimedes was called in to be given to teachers from the special needs department of West Bridgeford School in Nottingham. ■

• Free Archie for Notts teachers.

World first

NEC has developed a computerised translation system for English and Japanese.

Any person's speech can be translated almost immediately from one language to the other. The machine cannot understand words which it has not been taught, but it can be trained to recognise new or obscure words very quickly.

NEC is calling its product a world first, and says that there are massive commercial possibilities for the system. The first applications will be in hotel receptions, information services and hospitals abroad. ▒

Chip price hikes soon

Over the past year computer owners have been able to buy memory expansion boards at realistic prices. But that's all about to change.

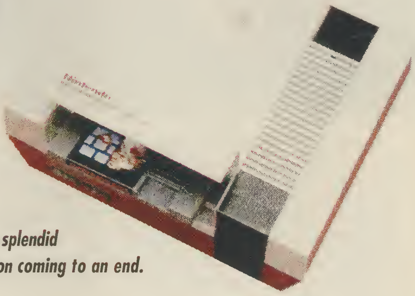
The cost of Dynamic Random Access Memory (DRAM) chips is set to increase, and price increases for memory boards will follow quickly. PC manufacturers will also find it increasingly difficult to go ahead with planned price cuts on their machines.

Prices are controlled according to the chip manufacturing performance of leading Japanese companies, and they are predicting a 10 to 15 per cent rise this year.

In 1988 the price of DRAMs caused European manufacturers considerable problems, but a dramatic drop during the latter half of 1989 saw manufacturers cut PC costs. Also, many owners of PCs, STs and Amigas found that they could add memory boards to their machines relatively cheaply. The price rises are likely to have a direct affect on the cost of expansion boards. ▒

NES games will now appear on other formats

NINTENDO RELENTS



• NES: splendid isolation coming to an end.

Games previously only available for the Nintendo Entertainment System are to appear on home computer formats, following a loosening of Nintendo's own practice of exclusivity.

Third party software developers are negotiating with Nintendo with a view to releasing games for other formats such as Amiga, PC and Sega Megadrive. In the past Nintendo has held a strong position and has been able to insist that partners do not release games for other formats. However, opposition from third party developers has forced Nintendo to re-consider this practice.

Also, the US Federal Trade Commission is investigating Nintendo following lawsuits from companies such as AVE and Tengen. Nintendo insists that this has nothing to do with any decision, although Nintendo watchers say the renewed level of scrutiny must have prompted a policy review.

Nintendo games which have already broken through to other formats have only done so by being too big even for Nintendo, for example *Teenage Mutant Ninja Turtles* – licensed from Tengen. To restrict it to NES format would have been a coup for the company, but Nintendo could not hold back such a big name. Even so, titles like *Super Mario Brothers* which are developed in-house by Nintendo, will not be available for other formats in the foreseeable future.

The company has played down its change of policy and no official comments are being made. Future Nintendo games scheduled for all formats release include *New Kids on the Block* and *Terminator II.* ▒

Windows success story

Such is the success of Microsoft's new operating environment, Windows, that the company has announced increased sales and profits of more than 50 per cent.

Windows, which makes an IBM PC easier to use, has sold two million copies since its high profile launch in May last year. For the six months ended December 31st Microsoft profits rose by 62 per cent to $200 million. Sales rose from $535 million to $830 million. Microsoft said that European buyers were even more enthusiastic about Windows than had been expected. ▒

• Chessmaster: *ultimate game for Amiga owners.*

New master moves

Chessmaster 2100 is out on the Amiga this week offering more features than a map of the Lake District.

The upgraded chess program is rated as a master at the game (2325) and as well as offering unlimited levels from beginner to Grand Master, the chance to play 110 classic chess games and a fully analysed hint service, also supports a library of over 150,00 opening moves.

The display is 2D or 3D and the board can be viewed from behind, from the side or directly above. *Chessmaster 2100* was developed from *Chessmaster 2000* which topped the serious games charts. It is distributed in the UK by Mindscape and costs £29.99. ■

IBM grows its own chips

Faster processing will soon be possible with a new process that lets silicon grow on an insulator. The high temperature oxygen furnace allows a thin film of pure silicon to grow on a silicon wafer base.

The process is being pioneered by IBM researchers and gives a pure defect free layer of silicon five times as thin as current technology allows.

A demonstration by IBM of the new technology clocked a switching speed of 33 picoseconds. This is more than three times faster than the current generation of CMOS transistors.

The silicon on insulator (SOI) technology offers other benefits too. By growing the silicon directly on to the insulator, the circuits are less prone to current leakage, circuits can be speeded up and the insulation can offer some protections against the electromagnetic, cosmic and nuclear radiation.

IBM hopes to use SOI to develop circuits with improved performance transistors. ▒

● News of more high performance chip technology is on page 14.

Tiny Texan

Those 386 machines are getting smaller and cheaper – here's the latest from Texas Instruments. The Travelmate 386 features a 20MHz SX processor, 10-inch diagonal black on white VGA display, standard floppy and 20Mb hard disk. Measuring a pretty slender 216mm x 280mm x 46mm it costs £3,665 which, by Texas standards isn't at all bad.

"It packs even more functionality into a notebook PC, and is our most significant accomplishment yet," enthused product marketing manager Colin Day. Call TI on 0234 224277. ■

Around the world on your ST

Gralin International, a partnership set up by two members of the influential Bournemouth and Poole User Group has launched *Geography Tutor* for the ST.

Sourced from Canada, the program features electronic maps and databases for every country in the world including facts on major religions, languages, large cities, population, life expectancy, national debt and more. Facts between countries can be compared, and the database is updated every year.

The program costs £29.99, available from Gralin, 11, Shillito Road, Parkstone, Poole, Dorset BH12 2BN. ▩

Games veteran goes into receivership

INTERCEPTOR CRASHES

The year has claimed its first victim in the games software industry – The Interceptor Group, which has been releasing entertainment software for nearly a decade, has slipped into administrative receivership.

The company had acted as an umbrella for different games labels including Players, Premier, Pandora, Smash 16 and Interceptor itself. Debts are reckoned to be in the region of £1.25 million. The company directors decided to wind things up because of massive debts and difficulties paying off loans.

Interceptor was set up in 1982 by the then 17-year-old Richard Jones. It has managed to release games of almost all genres moving from budget to full priced games without any difficulty.

• *Jones: industry veteran in trouble.*

The firm burst onto the scene with a simple game called *China Miner*. Despite a storm of protest and accusations of plagiarism (the game was very similar to *Manic Miner*) it was an enormous hit, and elevated Jones to early 1980s whizzkid status.

Since then Interceptor has released a string of graphic adventures such as *Warlord*, shoot-'em-ups like *Into the Eagles Nest* and huge budget hits including *Joe Blade*.

Interceptor could rarely claim to be a producer of really original software, but usually managed to come up with whatever the games fashions of the day dictated. Recently, though, chart success has been increasingly elusive.

Despite its predicament Interceptor is still trading and is seeking a buyer. Jones commented: "The computer industry has fallen on tough times recently. We did what we thought was best but we are continuing to trade.

"In the last year or so we have suffered from a number of bad debts due to the number of people going under. The economic climate hasn't helped at all. In a depression it is usually the entrepreneurial people who are affected first." ▩

Defence blunder

On the very day that Stealth fighter bombers, Tornadoes and computer controlled Patriot missiles started winging their ways across the blue skies of Iraq, Saudi Arabia and Kuwait, Texas Instruments blamed "persistent weakness in the defence industry" as it laid off 725 staff in the USA.

Two thirds of the lay-offs occurred in the company's defence systems and electronics group. The news came on the same day as the first wave of Desert Storm bombers flew in over Baghdad. Commenting on the rather untimely redundancies, Terri West of TI said: "It's too early really to speculate as to what impact the Gulf War will have".

Prior to January 18th the various non-aggression pacts, arms limitation treatises and general good will which had been so rife had made life hard for defence contractors especially in the US. ■

Get yourself tooled up

Bargain hunters should take a look at The Software Toolworks' latest offering for the PC.

The firm is slapping three top practical educational programs into one bundle. *Skillbuilder* consists of *Mavis Beacon Teaches Typing, Toolworks DOS Tutor, US Atlas* and *Evelyn Wood Dynamic Reader.*

And the *Atlas Pack* contains *US Atlas* and *World Atlas* which includes 240 full colour maps and comparative data on most countries in the world. *Skillbuilder* retails at £99 while *Atlas* costs £89. Call 0444 831761. ▩

MORE NEWS FROM AROUND THE WORLD ON PAGE 38

The lastest word on DTP

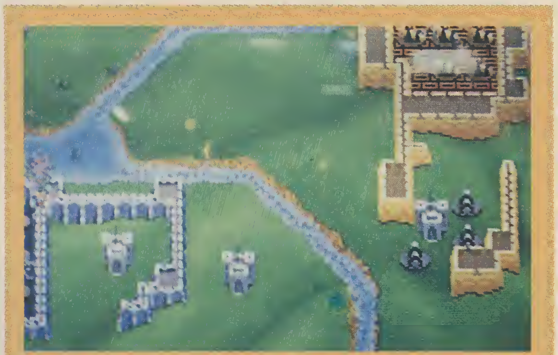
A desktop publishing package which features an in-built spelling checker has been launched by Penzance based Garbo Systems.

The company claims that PC users can now get rid of conventional word processing software. *Jetsetter 5.1* – which retails at £295 – features a 100,000 word dictionary with facilities for spotting double words or unwanted spaces. Call 0736 67166. ▩

Power tower Mac

Apple is understood to be working on a high-powered tower based 68040 Macintosh which will be introduced in the summer.

Price is likely to be around the £9,000 mark, but it is the specification which will have Mac fans pining. The Mac Tower's 68040 will zip along at 25MHz (twice the processing power of the 40MHz 68030 IIfx) and will feature 64Mb of RAM and 512K of ROM upgradable to 1,024K. ▩



• Ramparts: *state of the art in coin-ops.*

Coin-op parade

Every slot junkie's dream became reality last week at London's Olympia for the 47th Amusement Trades Exhibition International, writes Jeffrey Davy. As ever, the show was the launchpad for the year's new arcade games – by the end of the year many will be available on home computer.

All games sat on "free play" for ATEI's four days – the most imaginative, if not the hottest of the collection was Atari Games' *Ramparts*, a cross between *Missile Command* and *Tetris*. Three players must simultaneously attempt to build their own castles within a time limit using random shaped blocks, the only trouble is, you're destroying other player's constructions, and they're after yours with cannons.

Doubtless a home computer version will be with us soon, but it won't be at all related to US Gold's 1988 game *Ramparts*, which was loosely based on hit squash-'em-all *Rampage*. ■

THE WEEK IN VIEW

With the demise of Microlink the future of on-line communications becomes gloomier. But how pessimistic should we be? Volenté Roberts of top US on-line bureau, Aaron-Smith Associates, is still optimistic...

Would you enjoy watching a Shakespearian play filmed from a stationary camera? Certainly not. Neither did early movie goers.

It was not until film makers began moving the camera and using other techniques to enhance the imagery that the potential of films was realised. Historically, information products of the 20th Century (radio, television, personal computers) were not successful until each medium was able to exploit its own unique capabilities. The emerging on-line industry is no exception.

• Modem communications – full potential not yet exploited.

Like all information products, on-line services must meet specific needs and add specific value. People don't use an on-line system simply because it's on line. No one has trouble understanding the value of highly targeted information like stock quotes or legal cases. Systems with a clear focus easily make their niche in the market place. Information without context cannot succeed and many on-line systems fail to provide this context.

On-line publishing is no different from any other publishing. Hundreds of magazines fold each year, but this does not indicate the downfall of the publishing industry. Likewise, the demise of an on-line system should not call the entire medium into question. For the infant on-line industry as a whole to succeed, we must experiment further with the on-line equivalent of moving the camera. ■

Express Access

Yo! Get in touch with us! *Express* is always on the look out for news leads and tip-offs – and we'll pay you for passing them on too!

Also, if you have any burning ideas for features or surveys then drop us a line – remember, we cover every aspect of computing.

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COMING NEXT THURSDAY

Facsimile machines are becoming affordable, and even essential, pieces of equipment. How do they work and how do you add one to a micro?

We hear a lot about supercomputers and their sheer power – but how do they work?

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598 BATTLEFORCE Super strategy game !
156/157 ALL NEW STARTREK Get this One !
597 JEPARDY The game on the Amiga
596 COLOSSAL ADVENTURE and World
595 ARCADE,BOARD & CARD GAMES
594 MONOPOLY Play it on your Amiga
571 TREASURE ISLAND Great for Kids !
567 FRANTIC FREDDIE The old 64 Game !
561 CC GAMES Collection of Games
472 ED-209 Shoot Turtles,Batman + more
448 PACMAN 87 The old Classic !!!
447 RECREATION GAMES Otherllo etc.
446 BIONIX Great PD Shoot Em Up
283 PSEUDO COP Shoot Em Up
282 POPEYE LCD GAME Yes, well Ermm ..
280 MECHFORCE Strategy War game
276 HOLY GRAIL ADVENTURE Text Only

AMIGA BUSINESS PD

593 BANKIN Handles your accounts
592 WORDWRIGHT,AMIGASPELL Wordpro.
591 QBASE & SPREAD database
590 CLERK A Clerk program ? I dont Know
589 JOURNAL Keep track of your Bank !
496 VISICALC Great spreadsheet !
495 RIM DATABASE Powerful PD Database
358 UEDIT WORDPROCESSOR and more
434 AMIBASE A simple 8 field Database
179 FLEXIBASE Simple database
178 ANYLYTICALC Good Spreadsheet

AMIGA UTILITIES

602 ELECTROCAD DEMO PCB Designer
600 C-LIGHT - PD version of ray-trace prog
505 MAC CLIPART Great for DTP,etc...
494 ARP 1.3 AmigaDos Replacement Prog
466/467/468 Countach ClipArt - More DTP
464 Sozoban C - With ZC,A68K Asm ...
460 ICONMANIA Brilliant Icon Utils disk
378/379/380 C MANUAL (CLI) Just Superb
377 NORTH C - Compiler for the Amiga
356 MESSIDOS PC file read/Write to disks
354 SID 1.6 The best Directory Utility GET IT
345/346 VIDEO APPL. Fonts,Utils,and more
340 JAZZBENCH Flashy Workbench !!!
127/128 TV GRAFFIX Fonts and Backdrops
114 INTROMAKER creates scrolly demos

MUSIC UTILITIES

118 NOISETRACKER 2.0 latest version MIDI
119/120 ST-01,ST-02 Samples disks
122/123 ST-90,ST-91 New Samples disks
117 FUTURE COMPOSER chip music maker
459 JAMCRACKER Great Sequencer
485 STARTREKKER 8 Channels !! with MIDI
490 GAMES MUSIC CREATOR
126 FISH 300 Real time pitch converter

AMIGA MUSIC

587 CHIP MUSIC FESTIVAL Lovely Sounds !
586 RAF MEGA,MIX 1Great megamix
574 ECLIPSE MUSIC Superb Ripped Songs
572 NEWTRONS MB inc. the Headbanger !
569 DMOB MUSIC 3 Another Great Track
562 MANIACS OF NOISE Games Music
556 VOGUE GETPACK 2 Lovely musicdisk
544 BANGING RAVES Wild Rave music !
542 SILENTS FULL POWER House it up !!!!
532 CRUSADERS FEW TUNES ... Awesome !
531 CAPTURED IMAGINATION by 4-Mat
529 TECHNOTRONIX MEGAMIX The song
424 SOUND OF SILENTS Get this one !!!
286 REBELS MEGABLAST Great tracks ..
245 SCOOPEX BEAST from the game
242 100 C-64 TUNES Remember the 64 ?
227 JARRE DOCKLANDS Music and slides
425 DIGICONCERT 6 12 minutes of House
225 DIGICONCERT 5 The Power,Touch Me
224 DIGICONCERT 4 LeilaK and more ..
223 DIGICONCERT 3 Another 12 Mins !!
186 DIGICONCERT 2 This is Great as well!
220/221 DMOB 4 Ten superb House Trax
218 KEFRENS JUKEBOX Great music disk
133 CRUSADERS BACTERIA A Classic,Get it

AMIGA DEMOS

612 ULTIMATE FX by Goldfire - V.Good !!!
608 CRUSADE$RS Jan-91 Eurochart !
606 CRUSADERS do Genesis ! Brilliant !
601 HORIZEN MEGADEMO Yummy Stuff !
164 MENTAL HANGOVER Still the BEST !!!!
583/584 MAXIMUM OD Superb Vectors !
563 CULT MEGADEMO 2 Very Impressive
549 SAE 56 Cryptoburner HFTSO demo !!!
546 FRAXION FUTURE VISIONS Get This !
545 SPACE DELIRIA by Crusaders BRILLIANT
540 TROPICAL SUNSET and more stuff
530 ANARCHY MADNESS + more demos
512 DEEP SEA DEMO by Intuition
504 NETWORK PARTYPACK Great !
473 WRATH OF DEMON DEMO
453 EPIC PREVIEW This is Wicked, Get it *
445 4-MAT CES MUSIC Great music disk
437 ANARCHY CES PACK More demos
426 CRIONICS NEVERWHERE Just Superb !
257 CRIONICS DEMO with Madonna !
423 COOL FRIDGE Plasma demos FX
258 CANDYLAND 11 Lots of GREAT demos
254 TRIP TO MARS Fab vector gfx demo
252/253 BUDBRAIN DEMO 1 Hilarious !!!
142/143 DEMO PACK 3 Cebit90,Coma
109/110 DEMO PACk 2
107 Vangelis Demo 1Meg Great !!!
101/102 DEMO PACK 1 Brill Old demos !

MORE DEMOS ARRIVING ALL THE TIME SO GIVE US A RING IF YOU WANT THE LATEST STUFF ...

AMIGA SLIDESHOWS

570 NIK WILLIAMS BROADCAST Superb !!
520 TOTAL RECALL Slides from the film
493 VAX PICTURE SHOW Great !
491 SPACEPICS Nice Dpaint pictures
488 TRAVELLER SLIDESHOW Very good
484 COLOR CYCLES Great Dpaint stuff
463 COUNTACH II Fantasy Art show
462 COUNTACH I Fantasy Art show
461 FLINTSTONES ! Wilma and Fred !
454 NIGHTBREED Spooky slides from film
205 AGATRON 8 SLIDES Brill spacee slides
200 ROGER DEAN SLIDES Digitised HAM
191 FORGOTTON REALMS Nice Fantasy
183 NAGEL PICTURE SHOW Hi-Res Arty
158 AGATRON 6 SLIDES Totally Brilliant !
139 REAL 3D SLIDES This is Superb !
137/138 SILENTS SLIDESHOW Brilliant !
134/135 DIVINE VISIONS More Fantasy

AMIGA ANIMATIONS

578/579/580 STATION AT KHERNE (2 MEG)
575/576/577 LOST IN SPACE (2 MEG)
557 TIMEWARP Demo from Dragons Lair *
508 BUSY BEE Fab ray-trace anim *
474 SPACECHASE Great looped anim *
458 STAR TREK FLEET MAN. The BEST ! *
457 TRON/SPACESHIP More by T.Richter *
456 STEALTHY 2 Cutsey Jet Fighter Anim *
455 LOTUS/JET/POOL T.Richter 512K Anims
452 ENT.LEAVING DOCK Another Classic *
212 STAR TREK Great 512K anims by TR.
198 THE RUN The lotus car chase *
192 WALKER II Helicaopter Attacks Walker*
398 FRACTAL FLIGHT Flight thru a Valley *
207 LUXO TNGR Funny lamp anim *
206 NEWTONS CRADLE An amiga classic !
112 SPACESHIP Zooming round a globe *
106 JUGGLER/EL GATO Great Anims *
104 HAPPY MAN plus four more 512K anims

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??? DEMONS SLIDESHOW III - Very impressive stuff
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599 BUDBRAIN MEGADEMO 2 Fabulous follow-up Get It !
588 WARFALCONS UTILS DISK 1 Lots of useful stuff by Red Devil
568 RED SECTOR DEMO MAKER Creates unbelievable demos !!!!
603 PROTRACKER New Professional Soundtracker - A Must !
604 ST-92 - More fantastic new samples for ST/PT/NT/MED ,,etc
605 ST-93 - More samples as above from everywhere !!!!!
996 STARTUP SEQUENCE 7 Our Catalougue Disk With demos/Utils

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EXPRESS MAIL

With your host Haydn – the man with the fivers to give away

Write and tell H F-W what you think about anything under the Sun! Reach him at: *Express Mail, 30 Monmouth Street, Bath BA1 2BW.* Sorry, no personal replies, even with an SAE, as we're too busy writing the magazine.

ONE OF HAYDN'S £5 WINNERS

Amiga answers

So many Amiga things in *Express* 115 to talk about!

As to R Harley and his Amiga 3000 – I sympathise. I have an Amiga 300 with a 40Mb drive and have run into the same problems with games. Things are looking up though – it seems that a lot of American owners have 3000s or accelerated 2000s and are equally unhappy with games companies. Hopefully, this will prompt them to some action.

Many of my games (from the days when I had an A500) almost run, suggesting problems with the ECS. Meantime, Mr Harley, get hold of Bob Dinnerman's F18 Interceptor – it may be one of the oldest Amiga games, but on the 3000 it really moves. You should be able to install in on your hard drive too...

As to technical information, I have found Commodore to be tight-lipped about such stuff. If you want more information, you will have to become an official developer – and there are three classes: Commercial, the category for people who have already developed Amiga applications (£300 a year); Certified, for people who are in the process of developing applications which may be of a commercial nature (£150 a year); and Registered, for people who have a general interest in programming the Amiga (£75 a year). If you want the latest technical information, you'll have to sign a non-disclosure agreement – contact Commodore for an application form.

Get in touch with me if you need any more info!

Mike Froggatt, Churchill College, Cambridge CB3 0DS

Thanks a lot Mike. For that kind of detailed, helpful advice I'm more than happy to supply a fiver. In the panel below my next correspondent has a slightly more commercial message to put forward...

H F-W

ONE OF HAYDN'S £5 WINNERS

Joy without sticks

I recently came up with the idea of using one of my Megadrive joypads as a second controller for an ST game. It works fine, if only in the mouse port.

This led me to think that after all the whingeing done by games players and programmers alike throughout the years about the lack of a decent controller for home computers, now that one has arrived it's being completely ignored! Why not make more use of the joypad?

Now that a controller with three independent buttons is readily available, why don't the developers do something about it? It's not too expensive for the software houses to implement, and a joypad is a thousand times more useful than the keyboard which can be too far away from you when you are in a tight spot.

In many old Spectrum games, user-definable keys could be used. Why not include user-definable joystick/joypad options that give the user freedom of choice as to which particular make of controller is used and in which way. This would cost software developers virtually nothing to implement, and since joypads are sold separately from consoles (for £15-£20) this option of control would then be open to all users.

And the reverse could apply. There must be a large amount of console games that would benefit from mouse control – like megadrive Populous).

Michael Hoey, Glasgow

The old ideas are often the best, Michael. The trouble is, once a standard has been established and all the benefits of having a single standard made obvious, people find it difficult to break out from the constraints of that standard. The definable key options in early Spectrum days came into being because Spectrum games could only be played via the keyboard, or using the Sinclair cursor joystick. Other designs for joystick interfaces evolved and after a while the Kempston interface became a virtual standard – but redefinable keys stuck around, partly because developers already had the routines lying around and partly because the user base still had a variety of joystick interfaces.

Once machines (other than the Spectrum) were produced with integrated mouse and joystick ports, giving users the kind of 'freedom of choice' you advocate was no longer vital.

Still, it's a good idea, and might yet be taken up by entrepreneurial software publishers. Have a fiver with my compliments...

H F-W

ICPUG plug

With reference to Mr Harley's letter in *Express* 115, please let him know that help is at hand!

We would suggest that he joins ICPUG (*No! Really – HF-W*). At least 20 of our members own the A3000. Some members are registered with Commodore as developers, and as such we receive a great deal of advice from Commodore's Developer Support department.

The ICPUG Journal, which consists of 100 pages is produced six times a year and covers all Commodore machines. All our public domain software is free to our members, including 700 disks for the Amiga.

Membership for 1991 costs £17, which includes a £1 share in ICPUG. Details from Jack Cohen, Membership Secretary, PO Box 1309, London N3 2UT.

John Bickerstaff, Chairman, ICPUG

And that's enough free advertising for ICPUG!

H F-W

Copyright questions

As to piracy, what matters is why we have protection of intellectual property rights. We have it in order to encourage people to take the trouble to do creative work.

I have quite a lot of trouble getting my stuff published. The two stools I fall between are – if it's new, where does the program and my credibility lie, and if it's credible, is it plagiarism?

I want my ideas circulated, but I want to get paid too. An author such as DH Lawrence very much wanted his ideas to be public property, but he was always short of cash because his books were banned – well, *Lady Chatterly's Lover* was, anyway – and didn't become best-sellers until after he died.

Software writers who will settle for fame write for the public domain. A larger group will write for the shareware sector, hoping to progress to the regular market – either with a withdrawn shareware product, or a new piece of work.

'Professionals' who are only in programming for the money go to college, get qualified and work for someone else. They may never get to be Bill Gates, but they don't care much about that so long as the mortgage is being paid.

Software copyright is a bit dodgy. If a patent were to be used, then the source code would have to be published as a patent specification. If it's copyright, then that's just that – control over the physical process of making literal copies. This look-and-feel stuff and reverse engineering strictly comes under Registered Trademarks and Registered Design.

All these restrictions should – by rights – only have sufficient scope to cover development costs, finance a number of similar but less successful projects and to some extent act like pools payouts – an inducement to others to try. They are not intended to be a licence to hold the world to ransom.

Richard Robson, Redcar, Cleveland

But it's the profit motive that keeps the wheels of the capitalist system turning Richard. The more profit one company can make out of a product or an idea, the more profit it will seek to make – even if it is at the expense of wider issues.

Some interesting ideas about the motivation of programmers, though. Are they really driven by such creative urges?

H F-W

■ The PAL problem

I write in response to your reply to Alan Foster's letter in *Express* 115 in which you asked for enlightenment on the use of the full PAL screen in games.

Contrary to what Alan seems to believe, it is not some ploy by programmers to write for NTSC (American standard) televisions in preference to PAL sets. 90 per cent of British games are written as PAL products with little or no thought to export versions (all credit to Dino Dini here for writing his Kick Off software to both standards).

The reason games programmers don't extend the play area to the bottom of the screen is the problem of processor time. The more screen that the game uses, the more processing that is needed. Add onto this the fact that a lot of screen modes used in games actually slow the processor, and it's clear that the Amiga is not the all-singing, all-dancing wonder machine that many members of the public believe.

When the Amiga is maintaining a high-resolution screen or a dual playfield screen, something has to give. The 68000 processor is stopped in its tracks by the Amiga circuitry to allow the video hardware to access memory and form the video picture. On a normal, low-resolution screen the 68000 can run at full speed because the hardware is so designed that the video hardware grabs data from memory when the 68000 is busy and doesn't need to talk to memory itself. On a higher resolution screen, the video hardware doesn't get enough time for talking to the memory using this technique and the processor is stopped in favour of allowing the video chip to talk to memory. This can slow execution of programs by up to 16 per cent. As an example, take *Shadow of the Beast* with the large area of unused screen at the bottom. Had this area been used, the game would not have run at 50 frames per second but dropped to 25 frames per second. The programmers chose to switch off the video output to this part of the screen to get that extra burst of CPU speed which was so crucial.

Andrew Whittaker, Hull

Cheers Andrew. That clears another debate up – unless anyone else has five pee's worth to add, of course...

H F-W

■ An engineer told me...

I am a software engineer and fully appreciate the necessity for backups. We do have the situation in the industry where backups of some commercial software may not be legally made, but there is a world of difference in the commercial world in that the purchaser is usually in a much more privileged and influential position than your bod buying games in the High Street. You don't refuse replacement disks to someone spending tens or hundreds of thousands of pounds on your product!

I believe that at the end of the day game publishers don't really give a toss if the purchaser's £25 worth of disks get screwed up. They've got their dosh and may be in for a little bonus if people decide to shell out a second time.

So come on! Stop chanting 'it's against the law' like some mystic evocation and let's hear some reasoned argument on the subject of backing up software. I believe that games publishers take the view that they are justified in restricting an obvious and natural right of the purchaser in order to avoid abuse of this right. This is clearly misguided, since copies of games are made anyway by pirates.

Steve, Dorset

Well I thought we'd already had a fair wodge of reasoned argument on the matter Steve – or perhaps you are addressing your plea to the software publishers?

I can understand ELSPA's line when it encourages its members to include a 'condition of sale' with its products that effectively makes taking a backup illegal – many backups are not just backups but pirate copies. But it would be nice to see ELSPA members also including a guarantee of replacement in case of damage or nasty accident, thereby giving as well as taking away. I'll ask some questions and report back...

H F-W

■ Misdirection?

I feel I must write and expose the truth about *GB Route* (*Express* 13). *GB Route* is of little practical use, it only knows very major towns, villages are out. I have tried this program out (as I do a fair amount of driving for a living). Every time I have had to ditch the printout and pick up the road atlas.

What amazes me is how Keith Pomfret could make this rubbish up about it . Could it have something to do with Complex Computers having a full page ad? Don't want to lose their custom do we now? *GB Route* is most definitely not worth £39.95 it is not even good enough for public domain. My advice is not to buy *GB Route*, but to get an ST emulator and *Autoroute* (you get what you pay for).

I can vouch that *Autoroute* works perfectly under Medusa. OK I've had my rant, now but please can we not have any false reviews. Please?

anon

How dare you cast such aspersions, Anon! Keith had no idea that Complex Computers was planning an ad when he wrote the review. But over to the Big Man himself to answer your accusation of 'false reviewing'...

H F-W

When you consider the alternatives in route planning software, you'll find that *GB Route* is by far the cheapest. Your value verdict is well out of line. *GB Route* claims only to offer main roads and motorways. I used it for several journeys (three of them commercial) and found it to be OK.

You don't need every landmark in the world to find a place. I managed to find Quinton on my own after taking a route to Brum. But then, if you don't even know your own name.

Three reviews in other magazines seemed to agree with big K! So stop whining...

■ Bad grammar

On page 4 of *Express* 115 was the headline: 'C64 Won't Lay Down'. This is a very bad grammatical mistake that won't LIE DOWN and I'm sorry to see it slip past your editor. (Was he having a lay down (sorry, lie down) at the time?)

I'm one of your over-50 readers and was glad to see from your letters page that I am not alone. I hope I'm not alone, either, in noticing such errors. No complaints about the content – always interesting!

Neil Foster, Prescot, Merseyside

Well it's not exactly the editor's direct responsibility, even though the illustrious Andy has ultimate responsibility for everything that appears on an *Express* page. No, headline writing is down to our production editor Julie Tolley who appears to have been overcome by a touch of Brummie colloquialisation. You can be assured that she has been subjected to appropriate disciplinary treatment by our publisher.

H F-W

■ An entrepreneur writes

How many times have you heard the complaint about shows never coming to the south west? We have a lot of users here who just cannot afford to pop up to London or Birmingham, so I have decided to see what can be done locally. Before I go off and invest a fortune in advertising, booking a large site, printing tickets and flyers etc, I need to know the interest from exhibitors.

I envisage something like the 16-bit fair, and if the interest is there I hope to organise a show for April/May this year. Dealers, PD houses, software houses – if you could be interested, let me know so that I can get things organised.

Dave Burns, 10 Tilly Close,
Staddiscombe, Plymouth

Best of luck Dave – but are you sure you know what you're letting yourself in for?

H F-W

MAIL SHORTS

■ Name that printer!

I feel I must point out that your news article in *Express* 115 entitled 'Epson printer problems with ST' was based on a fundamental inaccuracy.

Epson has an extensive range of 24-pin dot matrix printers. However, the printer mentioned in your article – the LC24-200 – is not manufactured by us, and to our knowledge, no Epson printer has a fault that causes problems to Atari ST DTP users.

Edward Huggins, Epson

Unreserved apologies, Edward. The printer we were referring to is in fact made by Star.

H F-W

■ Console query

Why is the price of console games so high? I understand that part of the reason for charging so much for Atari and ST games is to cover losses incurred as a result of piracy, but this is no excuse for a console game as it cannot be copied easily.

D Tailor, Greenford, Middlesex

An 'empty' console ROM cartridge is much more expensive than a blank disk. Add on the percentage margins that distributors, retailers (and the VAT man) all expect, and you can begin to see why carts cost more.

But for a full breakdown, get yourself a copy of the February issue of *Sega Power* – there's a detailed, two-page feature that explains it all...

H F-W

■ Sexist Brummie?

A note for the 'Ultimate Good Guy' (*Express* 108). You have misinterpreted my letter – try reading it again. I did not say that women become programmers to prove they can beat men.

I wonder if Rod Lawton comes from Birmingham?

Sandra Clements, London

No. From Weston-super-Mare, every morning, on the train. With his flask and sandwiches.

H F-W

AS SEEN ON SCREEN

■ Archie spotter

I recently saw two Archie A3000s on TV. One was on *Jim'll Fix It* on Saturday 19th and was used to control the badge dispenser. The other one, on *The Mary Whitehouse Experience* on Thursday 17th was doing nothing

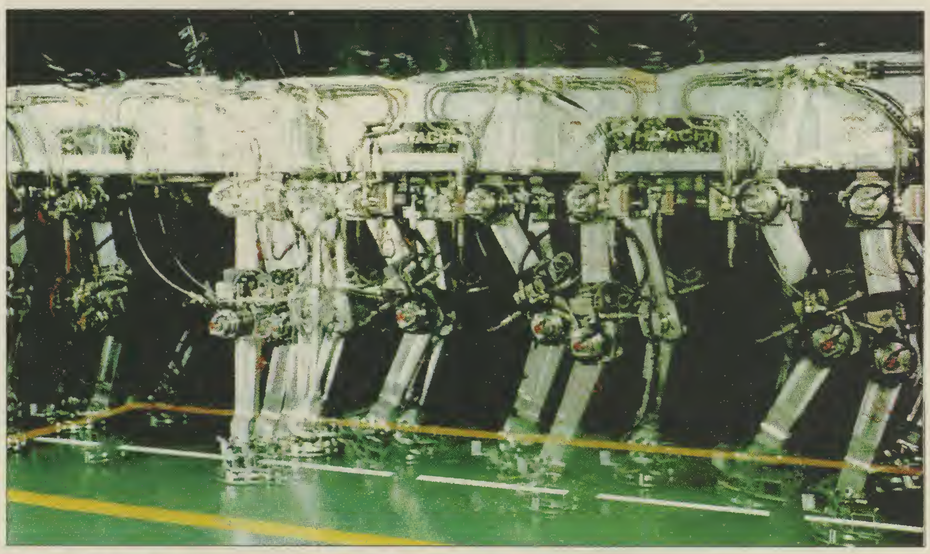
C Watana, Saxilby, Lincoln

You win a fiver, square eyes!

H F-W

WE HAVE SEEN IN

2000 AD is closing fast, so 21st Century technology is being developed right now. Hitachi, one of Japan's leading firms, recently showed off its plans for the next millenium. Stuart Anderton was there...



• This strange looking creation is a four-legged walking robot. It walks and steps over objects like any dextrous quadruped,and can handle uneven and unpredictable environments. The animal-like way of walking brings humanoid robots a step closer...

There are those who say, with some justification, that the 21st Century won't begin until January 1 2001, but most of us will be hitting the liver salts a year earlier. That's less than nine years time. Predictions for the end of the century are ceasing to be science fiction and starting to be based on actual research and development work going on right now.

Most of this R&D work is kept secret to protect high-tech firms against industrial espionage. But Hitachi, the world's third largest consumer electronics company, decided to break with tradition two weeks ago when it put on an exhibition of its current research. The excuse for the show was Hitachi's 80th birthday, and some of the work on display holds out high hopes for our technological future.

By no means all of the advances on display were to do with computing, but it is surprising just how much fundamental research is being carried on by a firm most people associate with TVs and music centres rather than microelectronics. For example, in the world of RAM storage, the amount which can be stored on a single chip has been increasing steadily over the last ten years; by the end of the century the chips on offer should be able to hold 8Mb on a single sliver of silicon.

Hitachi has already built a chip with this incredible storage capacity; containing 140 million transistors and capacitors the chip runs on only 1.5V and draws 44 milliwatts – around a tenth of the power usage of current RAM. Huge RAM chips with tiny power consumption will revolutionise laptop computing – just three chips will hold more information than most hard disks and be many times faster (50 nanoseconds access time) and use less power.

Liquid crystal displays on laptops have been improving rapidly in recent years. The blurry, low contrast, low resolution days have gone, with state-of-the-art laptops like the Mac Portable offering a screen quality comparable to a monitor. Sharp is selling a colour LCD system, but its colour capabilities are limited (16 colour fixed palette) and the colours pale and slightly blurred. Thin Film Transistor (TFT) technology will change that in the coming years.

Hitachi has demonstrated a 10.3-inch colour TFT LCD monitor which is simply stunning. It has an extremely high resolution of 1,120 x 780 pixels and displays 512 colours – 4,096 with some software twiddling. Being an LCD it is completely flat, and the superb backlighting and TFT technology make the contrast and colour saturation superb. Its screen refreshes commendably fast – a 50 milliseconds response time – which makes using it with a mouse practical.

The 10-inch TFT LCD is the closest a monitor has yet come to resembling a piece of paper, and will undoubtedly make huge inroads into the cathode ray tube monitor market. At present the size of the backlight makes it too thick to fit in a clamshell laptop, but that will soon be rectified.

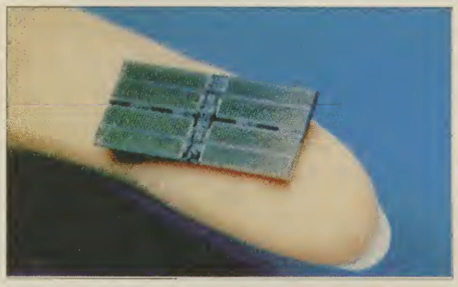
Still on the liquid crystal front, a huge 100-inch (2.5-metre) projection LCD has been built using thin film transistors. The ingenious system is extremely narrow for such a vast screen – just over a metre deep. It manages this by organising three 5-inch LCD screens at right angles to each other. One produces the green, one the red and one the blue. The three screens are backlit by a metal halide lamp and the three images are combined with a cross-shaped dichroic mirror and a single lens to project onto the screen.

Because of the single lens construction and its small size and weight, the large screen will be considerably cheaper and more portable than current models, opening up some interesting possibilities in the performing arts, as well as more conventional applications.

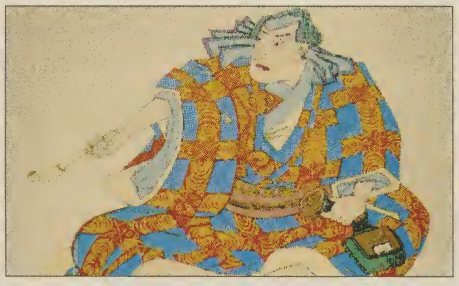
Huge TV screens like this will be ideal for High Definition Television (HDTV) when it arrives. At Hitachi Technology '91 the firm displayed its latest HDTV receivers and video tapes. An HDTV screen is a different shape to conventional screen, with an aspect ratio of 16:9 as opposed to 4:3. This gives a Cinemascope appearance to the screen which takes some getting used to, but when you have the combination of the wider screen and an intrinsically sharper image the whole effect is breathtaking. Because the image is digitally encoded rather than using the analogue system our own PAL TV sets use, it is much sharper.

HDTV is due to commence broadcasting in Japan later this year; we, as ever, are some way behind. HDTV in this country has just received a major setback with the merger of BSB and Sky. Rupert Murdoch has decided to concentrate broadcasting on the Astra satellite, but Astra cannot broadcast HDTV signals unlike BSB's Marco Polo orbiter. You need a satellite system to broadcast HDTV properly, and D-MAC, the Marco Polo system, had the capability to include these new signals. Now we will have to wait and see if anyone else takes up the vacant slot.

Video players are also seeing a revolution; not only



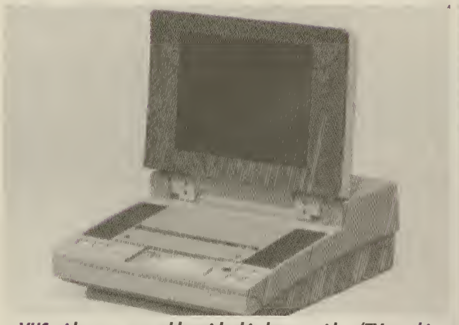
• This tiny DRAM chip holds a huge 8Mb – 170 times the memory of a Spectrum!



• This picture doesn't do justice to the clarity and colour saturation of the 10-inch TFT LCD monitor.

• High definition television is coming soon, to Japan at least. Huge screens show HDTV at an outdoor event in Tokyo.

NTO THE FUTURE



• *VHS videos go portable with this laptop video/TV combination which has a state-of-the-art 10-inch colour screen.*

are models being developed which can record HDTV signals, but also ever smaller devices are being built. Portable complete video playing machines have been around for a while, but they have suffered from small screens and use expensive and non-standard 8mm tapes. Hitachi showed a laptop machine with a 10-inch full colour display at Hitachi Technology '91, but the remarkable thing was that it used ordinary VHS tapes (actually S-VHS). The 10-inch screen means that several people can view the screen simultaneously; a portable machine like this could have massive implications for multimedia.

Another device which will interest multimedia aficionados is the CD^2. It is a portable laptop CD-ROM player with a five-inch colour LCD screen and a touch sensitive panel you use as a mouse substitute. It uses CD-ROM/XA disks which can store 2,000 full colour compressed VGA images or up to 16 hours of sound. A parallel output allows the device to be hooked up to a printer or another computer. This tiny CD-ROM player will have many uses as a portable multimedia workstation, as well as being an invaluable data resource.

The combination of these technologies will produce, by the end of the century, consumer devices which will change our home life as much as video has in the last ten or twenty years. We can look forward to huge high definition TV screens filling entire walls for home entertainment, with portable personal videos, computers and CD-ROM players adding the personal touch. Flat screen colour LCD technology will oust heavy, large, hot, distorting cathode ray tubes from most applications. These predictions for the end of the century are no longer based on extrapolation, science fiction and wishful thinking; the technology is there, has been demonstrated and it works. All that remains is for it to be made in production quantities, put in a stylish box and priced up. ■

• *The Hitachi CD^2 is a portable CD-ROM viewer which incorporates its own 5-inch colour TFT LCD screen.*

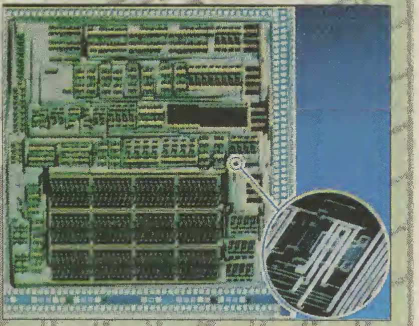
Looking to 2010: getting down to the basics

Fundamental research is being carried out in Hitachi's Central Research Laboratory which the company hopes will provide the technology for devices yet to be imagined. One thing which is becoming clear from this research, however, is that future technology is going to be weird.

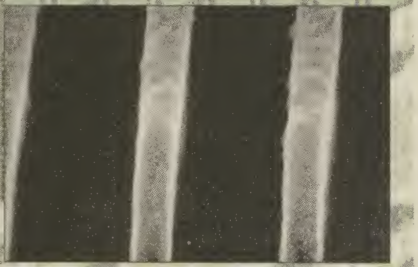
For instance, Hitachi is working on a levitating car. It seems that high temperature superconductors – substances which have an electrical resistance of zero – will float above a magnet without drawing any power at all. Current levitating trains require powerful electromagnets for them to float above the ground; superconductors just hang there above an ordinary fixed magnet. Since most of the friction of a car comes from the tyres, a floating car could be more efficient and go faster; all you need is to have magnetic plates embedded in the road. If a weak electric current is passed through a device called a linear motor on the ground, you wouldn't even need to fit a motor in the car! The main problem is that a superconductor, even of the high temperature variety, needs to be cooled by liquid nitrogen. Fortunately liquid nitrogen is a cheap by-product of the chemical industry, and is freely available by cooling air.

The weird behaviour of superconductors can also be applied to computers. Hitachi has succeeded in building a microprocessor which operates using superconductors. Superconductor based switches, called Josephson junctions, operate much faster than those built with conventional semiconductors, and draw a fraction of the power too. The experimental processor only operates four bits at a time and has 128 bytes of memory, but it races along at a phenomenal 1,000,000,000 instructions per second (1,000 MIPS). Clearly there is a future in superconducting chips, but they too need to be kept extremely cold – around -270C.

The smaller and smaller sizes of chips being built from conventional materials are also producing strange effects. As the wires get smaller and smaller, electrons stop acting like flowing particles and instead act like waves, exhibiting refraction, interference and other wave-like properties. Devices can be built using this 'quantum wire effect' but this requires a totally new way of thinking about circuit design. Hitachi has succeeded in drawing lines only 0.07μm across using a scanning electron microscope, so investigation of these effects is becoming possible.



• *The 1,000 MIPS microprocessor.*

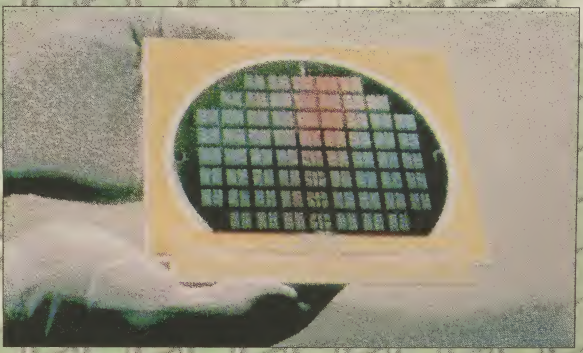


• *These lines are just 0.07μm across, drawn by an electron microscope.*

Less radical, but no less important for the future of high performance chips, is Hitachi's success in building fast BiCMOS technology into 32-bit processors, which currently use CMOS systems. In theory chips using bipolar devices like BiCMOS can operate at twice the speed of current chips.

Approaching the problem of computing power from the opposite direction, Hitachi's researchers have also built a working neurocomputer system. The wafer-scale device uses a single piece of silicon several inches across and incorporates 1,000 neurons. Neural technology is utterly different from conventional serial computers which simply execute instructions. Neural computers are programmed by learning, and are structured to mimic the human brain. Because of this their results are unpredictable, but they are good at pattern recognition and problem solving.

Hitachi has put its neurocomputers to work in a system which verifies signatures, but predicts that they will have uses in medical diagnosis, traffic control and robotic vision.



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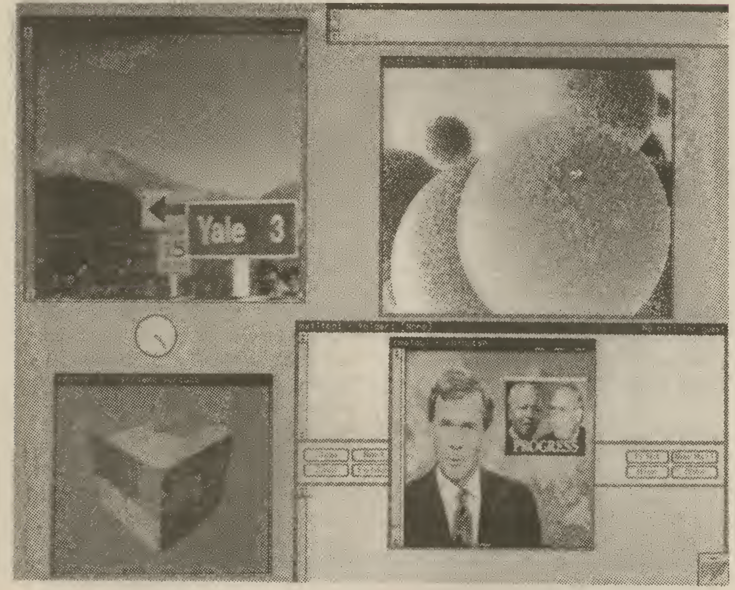
see Whole Wired World, page 38

A PC add-on board puts telly on screen – page 22



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Macintosh

MAC WORLD EXPO

As I write this, the MacWorld Expo has just finished in San Francisco. More than 60,000 people attended for four days of Macintosh extravaganzas, new product launches, free lunches, all-night parties...

Needless to say, Andy Editor refused to sign an expenses form for me to go, so unfortunately I've had to get all the information second-hand. But never fear; in a couple of weeks or so David Morgenstern will be talking about some of the products launched and some of the more off-beat happenings from the show.

The MacWorld Expos, for those who don't know, are the world's major Macintosh shows. They started out by only being run in the States (they're sponsored by the American *MacWorld* magazine) but have since spread worldwide. There are about eight this year in various countries, including one from March 12-14 at the NEC in Birmingham.

In fact, the UK is rather unusual for Macintosh shows in that the Expo is not really considered the premier event; that honour goes to the *MacUser* show, which is held in London around November every year.

However, the UK Expo should still be well attended, especially since it is accessible to more people, being based in the middle of the country rather than down at one end.

But enough of that; I'll mention the Birmingham Expo again a little nearer the time. Meanwhile, back to the States...

Over the last couple of years, Macintosh shows have been rather disappointing – not many new products, and not a great deal of enthusiasm either. But this year's San Francisco Expo was different; despite the economic recessions in both America and the UK, the atmosphere was cheerful and anyone visiting the show will have gone away confident that the Macintosh market is buoyant and will continue to grow for the foreseeable future.

One major reason for the upturn must be the introduction of the Mac Classic, LC and IIsi. Suddenly the Mac really has become accessible to 'the rest of us', and software developers have realised this and are taking advantage of the situation. Already, cheaper versions of some packages are being released for use on the Classic and LC, with many more on the way. (For example the low-priced version of *SoftPC* for the Classic, LC, SE and Portable, discussed last week, does not work on any other Mac; if you want to run it on a IIcx you have to go out and buy the full-priced version.)

And Apple doesn't seem content to rest on its laurels; news of two more new machines has been leaked from Apple headquarters in Cupertino. First off is a Macintosh 'tower' system – a floor-standing, 68040-based machine. It will have at least double the performance of the IIfx, and will be expandable to 64Mb of RAM. The price? Less than $11,000.

The second machine, which was due to be launched at the Expo but which was delayed due to a shortage of memory chips (some sources say that Apple ordered the wrong size!) will be a notebook Macintosh. Apple's chairman and chief executive officer John Sculley has promised that the notebook

POSTCARD FROM AMERICA

My end-of-the-year hard disk cleaning has given me plenty of time to mull over the year's events. Here are a couple of choice tidbits:

BEST IMITATION OF A MACINTOSH DEVELOPER – JIM LENNANE, CEO DESCRIBE, INC.

Macintosh developers have been complaining for years about overpriced and underpowered computers from Apple. They finally got some help with the new models. There seems to be an echo in the OS/2 world.

DeScribe is an OS/2 word processor that's supposedly been $4 million in the making and marketing. Jim let IBM have it between the eyes at the last Seybold Publishing show, complaining of IBM's and Microsoft's lack of support.

"Where's a decent OS/2 machine?" he asked. "Why hasn't IBM introduced an under-$5,000 desktop machine with 8Mb of RAM?"

He also complained that he wasn't being granted an audience with IBM bigwigs to discuss planning and strategy. He said of IBM executive Jim Cannavino, "I bet if I said I was interested in buying $4 million dollars worth of their DOS PCs, he'd be in the BusinessLand parking lot kissing my butt!" Something we could all get behind.

VIRUS OF 1990—ZUC, THE ZUCCHINI VIRUS.

This virus was discovered by Don Ernesto Zucchini in Italy last May. *ZUC* makes the cursor go crazy when the mouse button is held down. The cursor moves diagonally across the screen and then bounces from side to side like a billiard ball.

This was the year of the virus and Trojan horse. Four viruses were written by a teenager from New Jersey, who was nailed by the police. Perhaps young punk hackers will get the word that creating a virus is not cool, and hurts the community of users. We could use their energy, help, and real programming.

Here's a list of some other 1990 virus introductions :

Anti B virus
CDEF virus
FontFinder Trojan
MDEF A (Garfield) virus
MDEF B (Top Cat) virus
MDEF C
Mosaic Trojan
PostScript hack virus
Steroids Trojan

David Morgenstern

machine will be available to the public before the end of the year.

CLASSIC DELAYS
There are now delays of at least two months on deliveries of the Macintosh Classic. Future Publishing ordered three before Christmas and received a form letter in January stating that 'due to incredible demand' the machines would not be available for a little while. On phoning the telephone number provided, we discovered that the earliest we can expect to see them is early to mid-March.

Soooopa. There's certainly no way that Apple could realistically expect to set up any sort of high-street dealership with this kind of delay on delivery – punters expect to be able to walk away with a box the day that they fork over their hard-earned readies.

QUOTE...UNQUOTE
Here, courtesy of *MacWeek* magazine, are some of the top quotes from last year:

"The Mac cannot be the cause of death. Also, we will not allow the Mac to explode. [When] they want to blow up a computer, ...we say, 'Go ahead and use a PC clone'."
Daniel Lewis Paul, Entertainment Marketing Manager of Apple, on how the Macintosh should be used in films.

"Listening to some Mac users discussing colour is like listening to virgins discussing sex; they think it's all just a matter of turning some knobs."
Jayne Gould, a London publishing systems consultant.

"Too f—ing expensive."
Comedian Harry Anderson, on the meaning of "IIfx".

"Buy a Mac, dude!"
Bart Simpson.

MACPRODUCTFINDER
About a month ago, Apple began to ship a HyperCard stack called *MacProductFinder* with all new machines sold. It's a stack which lists well over 6,000 Macintosh products – both software and hardware – and gives their prices and UK distributors.

Although it has been boxed with Macs for a while, you may not have received a copy – especially if you were one of the people who had to wait for *HyperCard* to be shipped to you separately. So get yourself down to your local Apple dealer with a couple of disks and ask for a free copy. If you get no joy there, the manufacturer, Informac (071-721 7197) will be pleased to sell you a £20 subscription for the stack, updated quarterly.

Ian Wrigley

PC

BUYER BEWARE!
I went to the shops last Thursday, to buy a GX4000 console. The price cut to £80 and some judicious pruning of budgets finally swayed the decision – and the fact we needed one for a photo shoot the next day…

Now I won't mention the major electrical retail chain I visited, but the transaction went something like this:

I walk into the shop, stand significantly by the Amstrad display, looking keen and affluent. Nothing happens. Then I intercept a member of the sales staff.

"Hello, I'd like to buy one of these GX4000 consoles."

"What?"

"One of these new Amstrad games consoles, the GX4000."

"Oh. Don't know whether we've got any."

The salesman then makes a bee-line for the cash desk…

"Fred? [That wasn't his colleague's real name – I'm determined to protect the innocent (ho ho)] We haven't got any of these er… Amstrad er…"

"GX4000 consoles," I said.

"Yes we have!" said the salesman's colleague.

A GX4000 was duly produced and I was sent on my way. Did I get a carrier bag? No I didn't, but never mind.

Now, I'm a pretty even-tempered sort, but even I was getting slightly shirty by the time I got my machine. OK, so it's more a problem with this particular retail chain than it is for Amstrad – I just hope Amstrad is aware of the sort of dynamic, thrusting sales techniques being used to push its machines.

Anyway, I'd better not name the chain in question. (Except that it was Comet.)

PROTEXT ROM PLUS PROBS...
I had a call from those very obliging people at Arnor the other day, worried that *Protext* on ROM might not work on production versions of the Plus. We checked it there and then on the office machines. And does it work? Well, there's good news and bad news…

The bad news is that it doesn't. That, by the way, is using a Rombo ROM box. The good news is that Arnor suspects it's not a serious problem and one that can be overcome with a software mod. It's good that Arnor is so clued-up and on the ball with the new machines – and still keen to support *Protext* on the Amstrad.

Protext on ROM, incidentally, is a wonder to behold. It's still a blindingly-fast text processor of course, but it also loads – literally – in a fraction of a second.

Arnor is on 0733 68909, and is currently selling *Protext* and its other ROM products at a special price of £25 (and cheaper in quantity), plus another £20 if you want a Rombo ROM box thrown in.

MYSTICAL
I seem to spend half my time playing and reviewing French games these days. There are two possible reasons for this.

One is that the French now turn out as much CPC software as UK publishers. But though the French market is a huge one, most of that country's software is destined solely for

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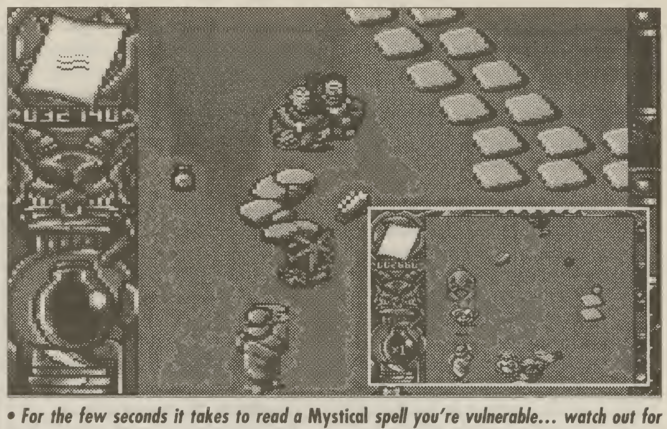


• For the few seconds it takes to read a Mystical spell you're vulnerable... watch out for that priest, he'll throw bibles at you. The little girl in the inset, meanwhile, is about to be trounced by the golem.

the home market, so I don't think that's the reason.

The second possibility (in other words the real reason) is that French software is almost always very original and very different. Sometimes the gameplay doesn't quite come together and occasionally the plots are nonsense, but they're always worth a close look. And Infogrames' *Mystical* is a typical French game...

Basically, it is a vertically-scrolling shoot-'em-up. You control a blue-robed trainee wizard walking up the screen collecting potions, scrolls and jewellry. The story is that you lost all your master's spells accidentally, and the wrathful old wizard has sent you out into a world populated with all manner of evil creatures. However, the old geek has got a kindly streak, and you're allowed to use any of the spells you find.

The gameplay is deeper than it might sound because when you pick up the wizard's potions or scrolls you have a choice: you can either use them straight away, or save them for later. To save them, hit the Spacebar, and they will be stored in one of ten pouches in your robes. Do nothing, and after a couple of moments your character will stop and either guzzle the potion you've picked up or read an incantation if it was a scroll. Then, any one of a number of things can happen, depending upon which spell it was.

For example, one spell instantly locks all the baddies on the screen into little iron cages. Another generates a magic sword which slashes its way up the screen, slitting gizzards as it goes. Or there's a potion which gives you a gun firing one, two or three shots (OK, not too mystical, this one), or one which will turn your enemies into stone!

There are many, many more spells than these. In general, though, the scrolls act as 'smart bombs', the potions as short-term weapons.

There are four 'worlds' to get through, each with three stages. Each world has a very vicious end-of-level guardian which needs a stiff dose of magic to defeat. Other 'ordinary' baddies you meet along the way include sweet little maidens, shepherds, bible-lobbing priests, walking trees, cavemen and lumberjacks. Take too many hits from any of these and you'll eventually lose one of your three lives.

There is also a two-player mode. At the start of the game another, flashing, character walks alongside you. This is your 'golem', and if you hit Fire before he disappears, another player can join in, controlling this extra character. The golem plods along, hands behind his back, until Player Two presses Fire. Then he leaps high into the air, crashing down on and crushing any monster daft enough to be underneath when he lands. The golem can't pick up or use spells, but he makes up for that with his destructive ability.

The best thing about the whole game is not the gameplay, though, but the graphics. *Mystical* is beautifully-drawn and extremely funny. Most French games are, but this one is special even by their standards. The expressions on the faces of the baddies as they meet their ends are delightful, and the effects of the spells are endlessly entertaining.

The gameplay isn't the deepest ever, but it's still quite challenging. What really sets *Mystical* apart is its sheer entertainment value and superb graphics. Highly recommended.

Rod Lawton

Amiga

THE WAITING IS OVER

Looking back, I thought that it would never happen. But, after what has undoubtedly been a torturous wait, I've finally laid my hands on the one piece of software that virtually every Amiga owner has been crying out for. Yes folks, I'm now the very lucky owner of several Amigas equipped with version 2.02 of the Amiga operating system (and they're not even A3000s!).

Before we go any further, I must point out that the OS that I am running is still a beta test release, so don't expect to be able to upgrade your own Amigas for a fair old time yet.

Commodore is officially saying that A1500 and B2000 owners will be able to upgrade within the next few months, but the news is unfortunately not so good for A500 owners. As reported exclusively in *Express* a few weeks back, Commodore revealed that it currently has no plans to make the upgrade available to A500 owners

All is not lost, however. According to a source in the States, Commodore US has now started shipping the A500-Professional complete with Workbench 2.0 and ECS, so it seems certain that it is only a matter of time before the 'speculation and hype' (as Commodore has referred to press reports regarding this new machine) is proved to be true. This will obviously be great for those willing to trade in their old machines for the new model, but the future looks bleak for the rest of us.

When Workbench 2.0 is finally launched, I can guarantee you that it will certainly have been worth the wait. Put simply, Workbench 2.0 is revolutionary. If you thought Workbench was pretty nifty in its current form, just wait 'till you get your hands on version 2! If you own an Amiga that can run *Workbench* 2.0 (theoretically, all machines should be able to run it), spare no expense to upgrade; you certainly won't regret it.

Some software will inevitably not work under Workbench 2.0,but the sacrifice is well worth making. So far I've found a couple of programs that don't like 2.0, but these are generally either PD or very old programs. And because of Intuition's new look (more on this next week), some programs do look rather strange.

Over the next few weeks I'll be taking an in-depth look at what the upgrade has to offer. In the meantime however, here's a screendump to whet your appetite.

FLICKER KILLER

American company ICD is certainly starting to make a name for itself. After the recent release of its AdSpeed 14MHz processor accelerator card (review soon), ICD has moved in to challenge MicroWay's monopoly of the display enhancer market with the release of its new Flicker Free Video card.

Just like MicroWay's unit, the £279 card has one role in life – to remove the flicker from interlaced screen modes. When used in conjunction with a multi-sync monitor, you can at last work in high resolution (or interlaced low resolution) without a flicker in sight. Just a rock steady picture that it as good (if not better) than any PC-based VGA display.

Nothing special so far (apart from the price!), but what makes ICD's card so special is that a single card will work on all Amigas. If you own an A500 and then decide to upgrade to either a 1500 or a 2000 (not an A3000, because that already has a display enhancer built-in), ICD's card can be unplugged and then plugged straight into your new machine without modification.

Also new from ICD is a compact internal hard drive for the 500. The drive uses the latest two inch hard drive technology to provide 20Mb of high speed data storage for the A500. Hard drives are obviously nothing new, but it's now possible to own a multi-megabyte A500 equipped with a hard drive, all of which live in a single box (no more spaghetti can't be a bad thing!).

For information on any of these ICD products, give Silica Systems a bell on 081 309 1111.

IS THE 1500 A DODO?

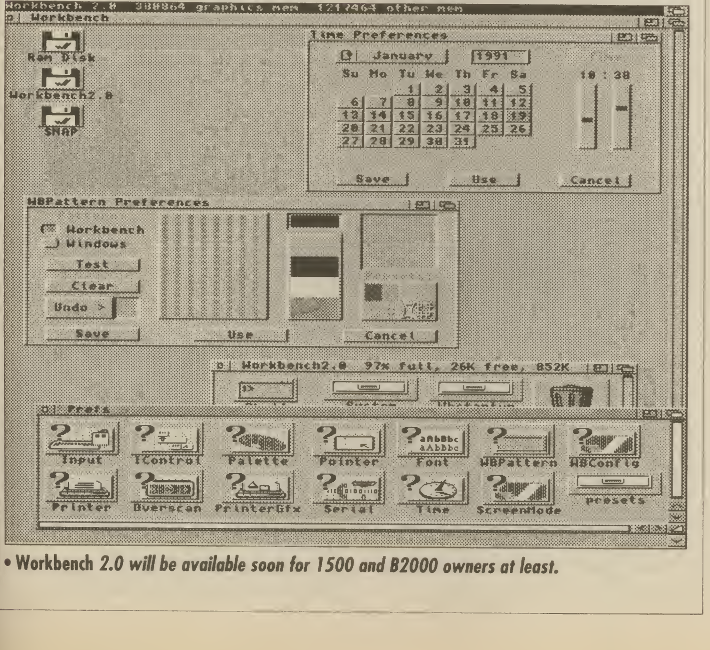
Since its release last year, the 'official' Amiga 1500 (not the Checkmate machine) seems to have been the target of a relentless slagging campaign. Both users and journos (who should know better) have been slagging off the new machine just because it (supposedly) does not measure up to the current model 2000 Amiga.

What very few of them seem to realise is that the 1500 is, in fact, better endowed than the current B2000. For reasons unknown to me, the entire Amiga industry has suddenly decided that the Amiga 2000 comes as standard with a hard disk. Personally, I haven't a clue where they got this hog wash from – never has the basic 2000 been made available with a hard disk as standard.

Perhaps they're getting their facts a bit confused. Commodore does produce a hard disk-based 2000 in the shape of the A2000HD (which comes as standard with an A2091-based 40Mb Quantum drive), but one of these beauties will set you back considerably more than the cost of a basic 2000.

Commodore recently revealed that it does intend to eventually make the 2000 a hard disk-based machine, but it seems certain that this won't happen for a fair old time yet. Rumour has it that the new machines will probably be upgraded to use the 68020 processor, therefore extending the 2000 spec still further.

If you buy a 2000 before these changes take place, you'll get nothing more than a 1Mb machine with just a



• **Workbench *2.0 will be available soon for 1500 and B2000 owners at least.***

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single 3.5 inch floppy (not a great deal of use, I'm sure you'll agree). In effect, you'll actually get a machine that is less powerful than the 1500.

Not only that, but the price of the 1500 also includes a colour monitor and a very good selection of bundled software (both games and productivity), so it would seem preposterous to even consider buying a 2000 in its current guise. Commodore probably won't like me for saying that, but these are the facts.

My advice to anyone considering buying a 1500 is to take the plunge and buy the machine now. The 1500 is a very capable machine that offers Amiga B2000-like power at a fraction of the cost. It'll take the full range of 2000-compatible cards and add-ons (including video cards such as genlocks and the Video Toaster), therefore upgrading the machine is both cheap and easy.

1500 REVIEW

On the subject of the Amiga 1500, my brand spanking new machine should have arrived by the time you read this (where is it, Commodore?). As a result, you can expect a full review in next week's issue of *Express*.

Jason Holborn

Archimedes

NOT ONLY BUT ALSO

Those awfully nice people at Longman Logotron seem to have been frightfully busy lately, not only have they released their rather natty *Magpie* hypermedia system (mentioned last week) but now, mere days later, a new desktop painting program hits the streets.

Revelation (for that is its name) is, however, not just *!Paint* Mk. II; the authors seem to have actually thought about the program for a while. It will work in any mode (although once loaded it refuses to allow you to change the mode which seems rather peculiar if you ask me), and happily multitask s in a window in true RISCOS style. It is also much, much faster than *!Paint*.

All the usual painting tools are available; dots, line, circles, flood-fills etc, plus the usual smattering of oddities; blur, trace and colour shift, for example, are rather fun to play with but I doubt if I'd use them *that* often.

Oh yes, and you can the ruler tool to measure distance or angles.

There are a couple of deviations from the usual RISCOS standard. First, controls such as zoom and air brush density are set by using slider-like controls. Nothing wrong here, except it means there is a set limit of eight zooms. The second is rather more interesting – the various sub menus (tools, colours, etc) can be 'ripped off' the main menu by clicking on their title bars. The sub menu then inherits quit and back icons and behaves like any other screen window so that it can be moved around the screen and doesn't disappear when you move off it. Very handy.

If you are editing in a 256 colour mode and rip the colour menu off in this way, you can use the bottom area of the colour window as a scratch area. This is most useful for mixing colours together (with the wash function) and then picking off the new colours with the pick tool.

All the editing tools, zooms etc can be used on this palette area, the only problem being that it is rather on the small the side.

I haven't really got enough space to go into much more detail now, so watch this space next week! In the mean time, watch out for *Revelation* , it's good.

BUT NOW, A BIT OF BETT

The BETT show is on as I write this and I managed to tear myself away from *Deskduck Plus* for a few brief minutes yesterday to see what was going on. The answer I'm afraid was 'not much'.

According to an awfully nice chap on the Acorn stand, "This is a show for showing rather than selling". With a result that there were not many new products on display. Apart from *Magpie* and *Revelation*, I briefly saw Acorn's own Level 4 file server and a couple of things on the CIS stand tucked away in the depths of the Blue Hall. I'm going back for a better look tomorrow, so I hope to bring you more details next week.

CIS was demonstrating *ArcMonitor*, as far as I'm aware the first real alternative to the *Memoryl command! It is a vast improvement over the built in Debugger module, but still doesn't really offer all the facilities one needs. You can trace programs, set breakpoints, copy register values and even set up simple memory mapping functions to stop delicate locations being over written.

PC-relative instructions are disassembled intelligently, the top few values on the stack are shown and there is even a small window to display VDU ouput in. However, there are no keyboard controls – not even for scrolling up and down – you have to use the mouse for all that sort of thing. Nasty.

The module has only one * command, *AM, This then enters the monitor until you quit it by clickin g on the Q icon. There are now quick disassembly commands for use from the command line. I *will* use *ArcMonitor*, but only until something better appears.

More interesting, however, was *TurboType*, a talking typing tutor. It is undergoing a few last minute tweaks, so I'll bring you more news when I've been tort how to tipe propalie.

Finally from CIS, to keep the game players happy, watch out in early February for *Chequered Flag* a 3D racing game following in the traditionof *Revs*. I was shown a very early version, and apart from the colours and screen resolution it was hard to distinguish it from The Real Thing! Corners, hills, chicanes, mirrors – who could wish for more...?

Computer Concepts was also there showing off (but not selling) *ShowPage* - the PostScript preview system and *Impression* 2.1. The latter with a number of tweaks and bug fixes plus a few new features, most notably a mail merge facility, faster formatting and vertical rulers.

GOOD GAME, GOOD GAME
It being the BETT show, there weren't many games on display (apart from *Chequered Flag*) so I've had to go further afield to find out that Eterna has three games planned for 'early' 1991. (That's Eterna as in *Sisteme* – the French company, authors of *Ballarena* and the too-tricky *Tactic*).

I only have names at the moment, but review copies are promised as and when. Keep a look out for *Blaston* in April, *Time Racer* in May and *Bubble Killer* in June. I hope the last of these is like *Bubble Ghost*, one of my favourite silly games on the ST!

The Serial Port/Eclipse has told me that it has gone through its 'Software Period' and is now in its 'Hardware Period' (probably followed shortly by the 'Bust Period' according to MD Andrew Foyle!) and so is concentrating more on its graphics enhancer, a SCSI card and Something Else – what, he wouldn't tell me.

Games and other software hasn't been totally abandoned, merely put on hold, so don't despair if you're a *Blowpipe* or *WorldScape* fan, just don't hold your breath too long!

4MATION INFORMATION
4Mation has just published a book to accompany its truly very nice *Poster* program. 'Written' by Mike Matson, *DTP Seeds* contains just over a hundred pages of ideas for DTP page layouts. There is very little actual text in the book and only the very minimum smattering of jargon, each page (of the book) contains one or two sample pages created entirely with *Draw, Edit* and *Poster*. Some of them have been very briefly annotated just to let you know why that particular page 'works'.

The book covers straight text layout, how to include illustrations, business cards, logo design, borders and so on. None of the ideas are copyright. In fact, the introduction encourages you to base your own ideas on those found in the book.

If you are just starting out in DTP and seem rather bewildered by the sheer range of facilities offered to you by *Poster* or *Impression, DTP Seeds* is an excellent place to start and at £8.45, it's a bargain.

THE ARCHIE SPOTTERS AWARD
It didn't take much effort to see the huge number of Archies used in *Capital City* on television, but how many eagle-eyed Archie spotters caught a glimpse of the twin-drived 310 used in *The Mary Whitehouse Experience* on the January 17?

Next week, more from the BETT show, Digital Services' Squirrel Database and maybe the lowdown on Level 4! Oh, and by the way, if you can't get AA-size Duracells, I belief the RAC do sell an equivalent battery.

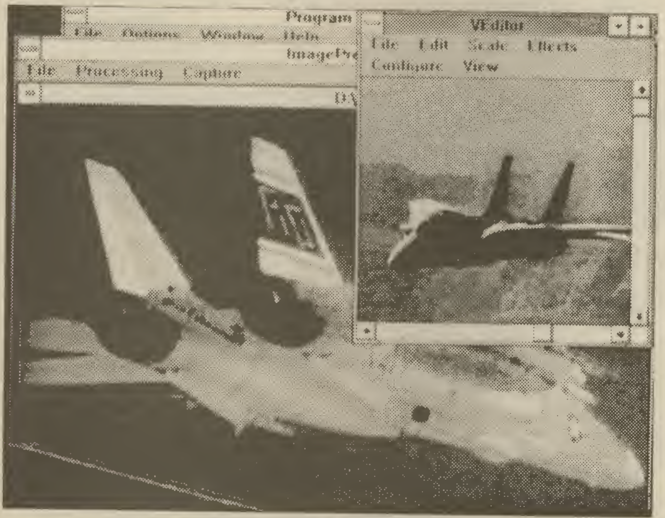
Ken Coumarin

PC

TV ON SCREEN
New Media Graphics in the States is selling a software/hardware combination which allows you to watch TV on a window under Windows 3. More serious uses for the technology are video grabbing and multi-media work.

So if you want to keep up with the Gulf while working in *Exel* then get in touch with the firm at 780 Boston Road, Billerica, Massachusetts 011821-5925. Prices start from $695.

SAVE OUR SCREENS
A couple of week's back in the news section we ran a short piece about a PC screen saver. This software blanked the PC's screen after a period of time and advertised itself as taking up less than 1K of memory. The price for this wonder was £95, which so incensed reader Reg Whitton from Leeds that he sat right down and wrote his own version, which he has kindly put in the public domain.



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Reg's screen saver is called SSAVE and will blank the screen of an MDA, Hercules or CGA PC after 15 minutes of inactivity. Pressing a key will return the screen, and usefully SSAVE doesn't affect any computation which is going on, only the screen display. And, of course, it takes up less than 1K of memory.

The program is in assembler but can be typed in and compiled by using DEBUG, the utility which comes with MS-DOS. To produce the program SSAVE.COM, enter the listing using a word processor which can save ASCII (text-only or non-document) files or, if desperate, EDLIN. Save it as SSAVE.ASM, then type:

```
DEBUG < SSAVE.ASM
```

This will produce a file called SSAVE.COM; run it and the screen saver will be installed.

Reg makes a few points about the listing: "The A on the first line starts DEBUG assembling. The blank line before the line with RCX on it must not be missed out or your PC will lock up. Don't put in any other lines or not everything will be assembled. The case of the letters and column spacing is not important."

The delay before switching off the screen can be changed to five minutes by altering the line MOV AX,3FFC to MOV AX,1554.

Here's the listing:

```
A
ORG     100
JMP     200
ORG     110
PUSH    AX
CS:
MOV     AX,[10E]
CS:
MOV     [10C],AX
POP     AX
CS:
JMP     FAR [100]
ORG     12E
PUSH    AX
PUSH    DS
MOV     AX,40
MOV     DS,AX
CS:
MOV     AX,[10C]
OR      AX,AX
JZ      15F
DEC     AX
CS:
MOV     [10C],AX
MOV     AL,[65]
TEST    AL,8
JNZ     158
OR      AL,8
MOV     [65],AL
PUSH    DX
MOV     DX,[63]
ADD     DX,4
OUT     DX,AL
POP     DX
POP     DS
POP     AX
CS:
JMP     FAR [108]
MOV     AL,[65]
TEST    AL,8
JZ      158
XOR     AL,8
JMP     14B
ORG     200
MOV     AX,3FFC
MOV     [10E],AX
MOV     [10C],AX
MOV     AX,3509
INT     21
MOV     [102],ES
MOV     [100],BX
MOV     AX,351C
INT     21
MOV     [10A],ES
MOV     [108],BX
MOV     AX,2509
MOV     DX,110
INT     21
MOV     AX,251C
MOV     DX,12E
INT     21
MOV     AH,9
MOV     DX,280
INT     21
MOV     AX,3100
MOV     DX,17
INT     21
ORG     280
DB      "Reg Whitton's",D,A
DB      "PD Screen Saver.",D,A
DB      "INSTALLED",D,A
DB      "$"

RCX
200
NSSAVE.COM
W
Q
```

Make sure you type it in precisely. It has not been tested in all possible situations, so you use it at your own risk, but it does show how compact a useful program can be.

If you have a short listing of your own you think might be of use, send it in (preferably on disk) and we'll pass it on to the waiting world.

Stuart Anderton

Spectrum

SAM SOFTWARE

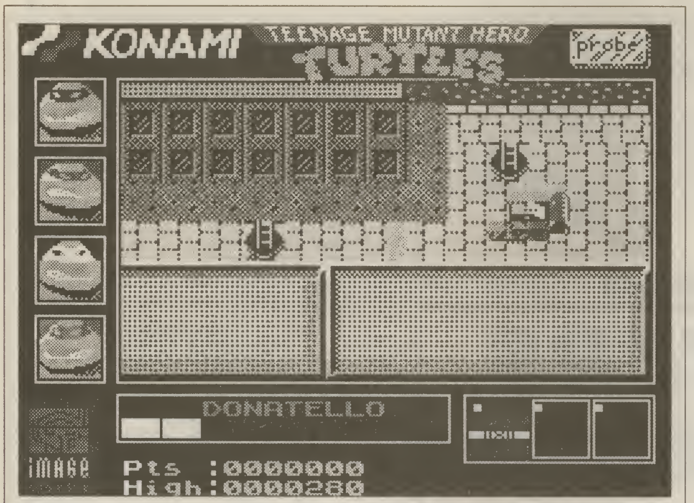
Some of the best serious software for the Coupé has come from the able programming fingers of Steve Nutting, who set up Steve's Software shortly after the first SAM rolled off the production line. He's already wowed Coupé owners with his *SC Assembler* which I've mentioned before and his latest product is *SC Filer*.

This is a database program for the SAM which stores 128K of data in its 256K version and a throbbing 384K if you've got 512K. Apparently, data is compressed so you can shoe-horn more stuff in and also define fields on screen using windows.

You can snazz things up with different character sets and colours. I'm told *SC Filer* will shrewdly allow you to convert files from rival packages like Lerm's *Address Manager* and *GM Base*.

The asking price is £10 and you should be able to get it from Steve's Software, 7 Nartrow Close, Hinston, Cambridge CB4 4XX from mid February.

Steve's also branching out his services a bit and is now flogging dust covers for the SAM. They are fully waterproof and machine washable and



• *You might think that Teenage Mutant Ninja Turtles are just a fad, but we reveal how they you can make them live forever, or at least until you're bored with the game.*

should protect your beloved machine from a potentially life threatening clash with coffee, concentrated hydrochloric acid or even dust. Price is £5.50. Owners of the Philips CM8833 monitor can also get similar protection for £7.50.

TURTLE CHEAT

Approximately loads of you bought the surprisingly good *Teenage Mutant Ninja Turtles* game this Christmas and here, rather exclusively, is the cheat mode for it. Feel free to shout hurrah and jump up and down in a joyful manner!

To make your turtle immortal press the following keys down together: 5, 6, V, G, B, SPACE The cheat mode can only be toggled on/off when one of the turtles is out in the streets.

And the truly wonderful human being we have to thank for discovering this deeply concealed secret is Michael Yau of Manchester. Loud cheers, free drinks and eternal gratefulness to him.

SERIOUS PROGRAM ALERT

Nice to be able to give you some tips of a slightly more techie nature rather than the usual pokes for getting infinite lives. A clever bloke called Steven Kemp sent in the following steaming batch of small but perfectly formed little proglets which have some pretty impressive effects. I'll leave Steven to explain what they do for the sake of clarity.

Irrevocable Hide Program:

```
1000 POKE 23635.PEEK 23637: POKE
23636,PEEK 23638: STOP
```

This program when run will hide lines 0-1000 of a program. Its position can be altered so that, for example, if you wanted to include a STOP option you could place this routine at line 9999 and GO TO it, thus hiding the entire program and returning to BASIC in one fell swoop! Please note: any program hidden with this line cannot be brought back.

Reversable Hide Program:

```
1000 LET a=PEEK 23635: LET
b=PEEK 23636: POKE 23635,PEEK
23637: POKE 23636,PEEK 23638:
STOP
```

This program upon execution will look exactly the same as program number one but this one will allow you to restore the program back again with a simple one line command:

```
POKE 23635,a: POKE 23636,b
```

But the variables will be lost if a CLEAR, or RUN is used before the one line.

Hide Program Number Three

```
8000 POKE 23627,PEEK 23637: POKE
23628,PEEK 23638: CLEAR
```

This is similar to the first two programs, only this one hides from below. So in our example it would hide lines 8000-9999. This program is irrevocable so could be classed as a deleting program. It works by transferring the NXTLN variable which points to the next line in memory, to the VARS variable, which points to the end of the program so telling the computer that there is no program after line 8000. This by itself would only cause trouble but this is put right by clear. Thanks Steven for those three stonking good routines.

As way of a reward he wants me to say hello to Vicky Betteny. Hello Vicky. Whatever next, birthday greetings?! Have you got any similarly spectabulous Speccy tips? Hints, cheats, pokes and routines for games, utilities and general programming will be given a cheery welcome when you send them to Robin Alway, The Spectrum Column, *New Computer Express*, 30 Monmouth Street, Bath BA1 2BW. I look forward to seeing your mind expanding wrinkle on my Welcome doormat as soon as poss.

BUDGET CHILDHOOD MEMORIES

These budget rereleases keep coming thick and fast. The latest essential purchase for joystick wagglers operating on a shoestring is the classic shoot-'em-up *Xenon*.

I have some misty eyed childhood memories of playing this when it first came out a year or so ago. It started out originally as a machine stretching 16-bit mega game and so naturally hopes weren't high for a successful Speccy version. As usual, though, everyone was wrong and on our machine it played with the kind of smooth moving graphics and tough aliens you usually only find in the smoke filled interior of the arcades.

It's a viewed from above blaster which has you swopping control between a ground-based tank and flying craft through a variety of sectors crawling with baddie weaponry. Naturally there's a fearsome big nasty end of level guardian you have to see off before you can progress although luckily you can build up your weedy craft with a plethora of add-ons ranging from go faster stripes to extra guns. An absolute bargain at one pence short of three pound.

Robin Alway

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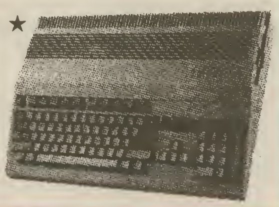

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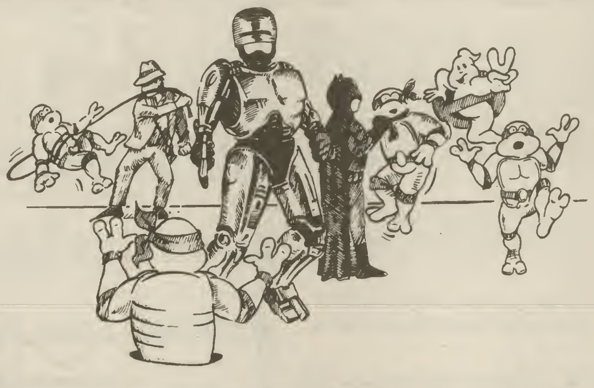

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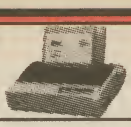

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64

BOARD WITH THIS

Ostentatiously-named Strategic Simulations Inc (SSI) continues to milk TSR's back catalogue of AD&D material with another release via US Gold but this time the effort has gone sour.

Dragonstrike is a conversion of TSR's massive boxed game in which players take control of dragons battling for control of the skies over the fantasy world of Krynn. The C64 incarnation takes the innovative form of a fantasy flight simulator in which the player rides on the back of an in-flight dragon, controlling it in combat against other dragons.

Sounds as funky as a very funky thing, doesn't it. Unfortunately, it just doesn't translate into much of a game. The dragons, wyverns and ground targets you chase in one of the many scenarios are both crudely drawn and animated. On top of that, none of it proceeds at more than a snail's pace.

But what finally shoots it down is the £25 price tag. It's just not on to ask that sort of money for a game with this little variety to it. Not even the typically glossy packaging can be held up in defence.

The SSI-TSR-US Gold triumvirate has been recycling old artwork well past its sell-by date and ought to cough up something new. A good game to go with it wouldn't go amiss either.

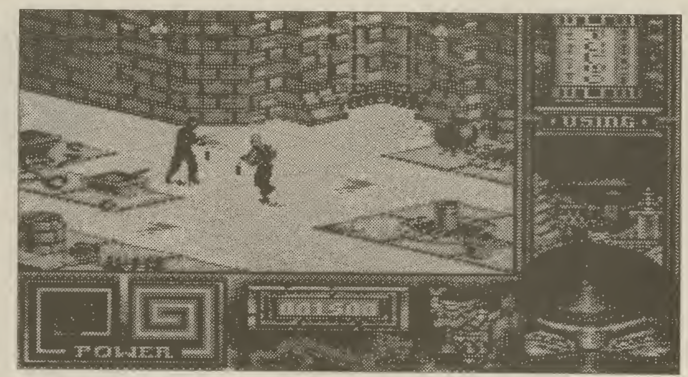
Next week, in *Board With This Too – Son of the RPG Conversion*, I hope to bring you happier tidings with details of Gremlin's much heralded *Heroquest*.

LAST LAST NINJA?

Cartridges hold a lot of promise as far as the 64 goes and it's too early to be glib about what they have to offer. Proof of this lies in the little box which will soon be known as *Last Ninja III*.

System 3's latest (in fact, fourth) game in the *Last Ninja* series arrived in preview form just in time for this column. It starts off with the kind of introduction sequence that players of state of the art Amiga games take for granted. It takes the form of a by-passable cartoon inter-cut dramatically with credits. In it, the SID chip goes absolutely ape, pouring out lavish sound effects on cue and wrapping up the whole package in one of the best soundtracks ever laid down for a C64 game.

Of course the best thing about all this is that it doesn't in any way impede on the quality (or quantity) of gaming itself. In fact, there are 70 screens over five levels, plus end-of-level sections to get your shuriken into. They're presented in the now easily identifiable isometric format adopted back in *The Last Ninja* but both foreground and background graphics have been significantly improved. They're more colourful, detailed and better proportioned than their predecessors.



• ***If future cartridge games are as good as* The Last Ninja III *then things look promising.***

As for playability, the same joystick moves control your character but it's now easier to do a running jump than it used to be. Much of the gameplay involves fighting but there's also a significant puzzle element, not only on a level by level basis, but as a pervading game theme.

LN3 is very different in this respect. Keep your eyes peeled for this one.

TURRICAN AGAIN

While we're on the subject of sequels (overtime at the tenuous link department) I should briefly froth about *Turrican II*. In many ways, it's a continuation of the original gyro-metamorphic arcade adventure but it's back with a vengeance.

The main character is handsomely animated and sports all the death dealing features that made him so popular first time around. The screens through which this new game takes you are a feast for the eyes. Massive cogs and gears rotate in a mechanic's nightmare of a machine that spreads across several screens but for total gobsmack value, you have to see one of the new end of level guardians. Their awesome forms are sometimes larger than a single screen and, rather frighteningly if you ask me, you sometimes see them a screen or two before you actually have to take them on. By gum. Spread that on yer parkin and munch it.

Sean Masterson

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THE RETURN OF THE RIPPER

Have you ever wondered about the mechanics of programming a game? I mean just how do they allocate space and get the 68000 processor to do all those wonderful tricks? The answer to these questions lies in a new cartridge called the *Ultimate Ripper* which lets you to rummage through code and extract anything that looks interesting. However it isn't a pirating cartridge as you can't save games to disk.

What the *Ripper* cartridge does is give you hitherto unheard of access to the memory of your ST, no matter what task it is doing at the time. The producers of the hardware claim that the *Ripper* can get into absolutely any program. I had a chance to check this claim out when MPH, the British distributor, sent me a copy.

The *Ripper* simply plugs into the cartridge port. There are no leads going to the monitor socket, only a switch on the side. To use the unit, you just hold down reset and flick the switch. Now you can access the code held in your ST. Pictures, sprites and fonts can be saved to disk, as can music, sampled or otherwise. The assembly code can be examined, modified or disassembled and disks can be edited.

The unit worked very well on the couple of games I loaded, although at the time of going to press I hadn't given it a thorough check out.

Ultimate Ripper costs £45 from MPH. Telephone 0604 503382.

WHAT A CAD

Combine the Atari SM124 monitor with an ST and you have the perfect environment for producing high quality mono art work.

The Germans noticed this a while ago and they've been producing professional quality software for the ST since its conception. The latest in a long line of superb graphics tools is *CADja*, a computer-aided design program, which is distributed in this country by Condor Trading Ltd.

CADja has one of those front end panels which would confuse a space shuttle pilot. A bewildering array of icons enable you to perform a myriad of graphical functions. Paper size ranges all the way from DIN A5 through to A0 and scaling ranges from 1:500 to 100:1. Catch functions include corners, outline points and centre of circle/arc. Drawing commands include polyline box, tangential circle and double-lines. Construction commands, changing commands and copy commands are all well catered for.

At £299 *CADja* is really only going to appeal to the serious ST user. If you require a high quality design package then this program is probably a much safer bet than buying a standard design computer. You can contact Condor on 0734 810066.

HIGHLANDS PD

ST owners living in the north of Scotland have always had to obtain their software from libraries in England. That situation has just changed with the arrival of a PD library catering to highlands and islands area of Scotland.

Caledonia PDL has set up shop in Inverness. Jake Bain of the company reckons that he's got some very exclusive software in his catalogue. One disk he sent me, was of particular interest. Disk AV_0034 contains software from the states and Canada. These programs are notable because they don't appear in other PD libraries catalogues.

If you'd like to have obtain a copy of Caledonia's catalogue, write to them at: 250 Oldtown Road, Hilton, Inverness, IV2 4PT.

ST ATLAS

Educational programs are often very unrewarding pieces of software. The ideas are usually bland and the programming atrocious, so it's nice when a decent program comes onto the scene. *Geography Tutor* is an electronic atlas which includes maps and information on every country of the world.

The tutor which includes professional-looking graphics is simple to use. You click on a country and then examine the database information on the area. Religions, languages, land area, national debt and life expectancy are just five of the subjects covered. *Geography Tutor* is just the kind of program which would enliven a geography lesson. It costs £29.99 and is available from Gralin International, 11 Shillito Road, Parkstone, Poole, Dorset, BH12 2BN.

PRAYING TO THE CONVERTED

The ST Club's new newsletter is out now. Paul Glover who edits the magazine keeps it very informative and the latest issue is well up to par. It includes a wonderful snippet from a speech by Charles Johnson of Codehead software in the states given at an Atari show:

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Issue 2 of *ST Applications* includes articles on *Fontkit Plus*, *Protext 5* and

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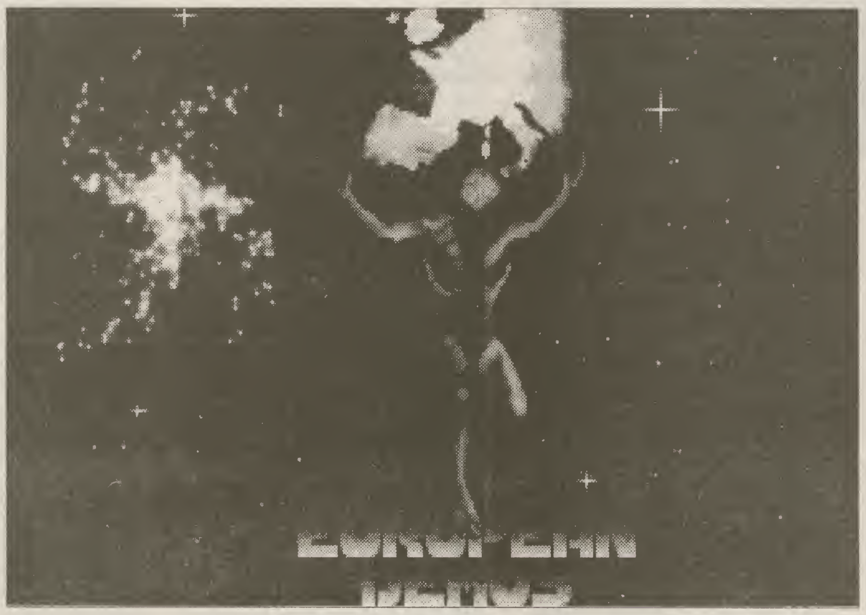
CLUB CODER

The popularity of ST demos circulating in the public domain continues unabated. While many of these demos are banal, consisting mainly of hundreds of greetings, there are a few which push the ST to its limits. What's more these demo writers can go on to become excellent games programmers. For example, *Enchanted Lands* from Thalion was programmed by an ex-Carebears coder.

The quality of demos has been steadily improving. I was recently gob-smacked by the Overlander's latest effort, namely the *European Demos*. This mega-demo includes some truly excellent tracker music and one of the best 3D demos I've seen in a long, long time.

The weekend before Christmas many of the better demo crews descended on a Dutch computer company's offices for a coding convention. The demo groups, including TCB, TEX and Sync were joined by software house Thalion for a weekend of debauched demo writing. The results of the weekend are currently available from all the decent PD libraries. This kind of weekend is a good idea as it brings demo writers together for the interchange of fresh ideas. Perhaps the software industry should encourage these soirées. There's a lot of untapped talent out there just waiting to be noticed.

Andy Hutchinson



• The European Demo from Overlanders contains some of the best 3D graphics seen on a demo as well as some excellent tracking music.

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TECH TIPS

Are you new to the computer world? Do you know what package to get for your spreadsheets? Are you confused over colour? Send your stories and queries to Keith Pomfret, Tech Tips, New Computer Express, 30 Monumouth Streeet, Bath BA1 2BW.

■ INFO! BBS stuff

In answer to *Express's* request regarding computer users over the half century I am one of these. I have been using micros since 1979 when I started on a 8K Commodore Pet (which still resides in the loft somewhere). Since 1985 I have run the Advance BBS which your good magazine is still listing The first BBS I ever logged onto was Fred Brown's Forum 80 which he claims is the oldest BBS in the UK and was on line in 1980

My BBS is on 0482 805225. The BBS gets it name from the Advance 86B which you may know was one of the first IBM compatibles widely available over here. It had a bit of a problem with INT21 which made most comms stuff useless until converted. I still keep a few patches etc. on-line for any remaining Advance 86B users. My old machine is still going strong at a friend's house. The BBS runs on a home-built AT with a 40 megabyte drive – I have some on-line games running plus the usual files for download and the message base including several Echo-Mail areas.

E. J. Sparrow, Hull

■ HELP! Long teeth

Although I am getting long in the tooth I have been bitten by the computer bug, to the extent that I enrolled and completed a series of evening classes which has whetted my desire to own a computer. I am writing to you for advice or suggestion as to the type of computer I should acquire. It will be used exclusively for recording my library, fishing, gardening, personal papers, addresses, etc. I will be most grateful for any assistance offered.

N. Kennedy, Co. Antrim

If you want to use a computer for data storage and retrieval, you'll need a computer with a disk drive that can run a database, word processor and mail merger. At the low end, the Amstrad CPC6128 plus would probably scrape by with an operating system and storage that could do the job. The 6128 is an 8-bit computer that is able to take on many of the more serious tasks at the sort of scale ideal for a home user, hobbyist or club secretary. For the less serious moments there are plenty of games and leisure programs available for the 6128. Software costs run from around £5 for a low price budget game to about £30-plus for a ROM-based word processor.

If you want to aim for the industry standard and choose a PC, you can expect to spend more, but you will get a more serious machine running the MS-DOS standard operating system that can be gradually upgraded as you grow with your hobby.

A sensible way to decide on which machine is to look around you to people that you know who regularly use computers and could be expected to help you through your learning curve.

Ask their advice and choose a machine that you know you will get support on. As well as the couple that I have mentioned, there are Amigas, STs, Archimedes, Macintoshes and PCWs. All will do the job that you require, but there's no substitute for an experienced helping hand to guide you.

In order to output your correspondence and records to paper, you'll need some sort of printer (unless you choose the PCW which has one).There are several simple 9-pin dot matrix printers on the market that would fit the bill. A couple to think about are the Star LC 10 and the Citizen 120D which cost around £150 and £130 respectively.

■ HELP! Video Amiga

I'd be most grateful if you could answer a couple of questions for me:

1) It is possible to connect my Amiga directly to the SCART socket on my Philips video (with sound)?

2) How do I make the lead?

Nick Taylor, Sunderland

Yes, it's possible and the lead is an off-the-shelf article that is available from any good supplier. If you do insist on making the lead yourself, you'll find the pin-outs for the Amiga end in the manual The 23-pin video output has all of the connections necessary to implement a direct connection to a SCART plug.

In order to get the sound as well, you'll need to connect the sound output from your Amiga. A couple of phono plugs attached to the Amiga sound output and the sound channel connectors of the SCART plug will assure you of Amiga sound at your video. Tandy will sell you the SCART plug, cable and solder that you need. The connections on the SCART plug are included with it. Tandy is on 021 556 6101. If you want to buy a lead ready-made you could try RSD connections on 0992 584205 or Simpson Electronics on 0332 760353.

■ HELP! Backups

I hope you can help with the following. Every time I buy a new piece of software I immediately back it up using Blitz Turbo, and by the way this is not piracy but purely for safety reasons as I store away the original in case of mishaps. I want to know if there is any device I can get such as a switch or some sort of a through connector that will stop me having to connect and disconnect from my printer and floppy drive ports and enable me to leave it present to back up when necessary. I feel that this constant unplugging, etc, is causing damage to my STE, so if any device is available how would I go about fitting it? Your help would be appreciated.

S. Carnegie, Glasgow

Backing up any software for any reason without the permission of the copyright holder is illegal. Even if you are making the backups for safety you are still breaking the law.

The type of switched lead splitter that you require can usually be obtained in one or two forms. The more elegant and expensive variant is a splitter box which takes an input from the computer and offers two or more switchable outputs. These are available off-the-shelf for upwards of £20.

Alternatively, one of the smaller lead and cable companies may be able to offer a cheaper and simpler switched cable to do the job.

■ TIP! Inverse alternative

Further to the inverter project to obtain 240v AC from 12v DC, would it not be possible to produce a regulated 9v DC direct from the 12v car supply, thus eliminating the 240v supply altogether, to use as a computer power supply?

John McCleave, Poole

You're quite right, the power supplies available from car, van, lorry and bus could be regulated and smoothed to produce the necessary voltages for computers and disk drives.

The devices that you would need to do this are readily available off-the-shelf and as you suggest, they would eliminate the 240v power supply. There are also monitors available that will run from 12 or 24v DC which could probably be used to provide the display. The inverter project wasn't intended to offer the only way of solving the problem. It offered one way of running a computer on the move. The advantage of the inverter project was that it wasn't exclusively a computer peripheral. The 60W output from the inverter could be used to drive any electrical appliance that didn't demand more than the 60W output. (The industrial microwave from under the desk was a bit too power thirsty, but a smaller appliance provided a hot meal on Dover Eastern Docks). Many trans-continental coach companies use inverters to provide on-board cooking and entertainment and the versatility of the inverter lies in its ability to accept mains appliances unmodified.

■ HELP! Colour CPC

I am writing to obtain information on the price of some equipment I require and would be greatly indebted to you if you could let me know how much it is and if one is available and from where.

My son has an Amstrad CPC464 with a green screen monitor, I have been trying to obtain a colour monitor and have been informed by various dealers and users that there is a modulator/power pack type box that can enable his PC to work from his colour television. I am only just starting out in the world of computers, as is he, so we really don't know what to get to achieve this. If possible could you advise me what to get and the most likely source, I believe its called an MP1. If it's not possible to obtain one of these would I have to change the computer? Also is it possible to convert the PC to take disks? One final question (at last) – are other monitors and equipment interchangeable or do I have to stick to just Amstrad products. I am sorry for the length of the letter, but as I said earlier we are novices in the computer world and would like to know more about it.

E. Hewitt, Arbroath

There are two modulators available for the Amstrad CPC series. They are the MP1 and MP2. and retail for between £15 and £30. The difference between the two is that the MP1 was designed for use solely with the CPC 464 and has no power supply for a disk drive. The later MP2 will work with 464, 664 and 6128 models as it has the power for a disk drive. While your son has the 464 which could be adequately serviced by the MP1, the general consensus of opinion among CPC users is that the MP2 provides a better picture.

A word of warning, though. When you connect a computer to a monitor directly, it sends a pure video signal to the monitor. This allows the monitor to faithfully duplicate the display on its screen. Utilising television technology is a step backwards. The colour video signal from the CPC is fed into the modulator. Here the red, green, blue and synchronisation elements of the picture are combined and modulated into a single RF signal of the type that is broadcast with TV programs on it. This is piped into a TV via the aerial socket. Once inside the TV, the signal has to be unscrambled into its constituent red green and blue signals to be passed to the red green and blue guns that produce the display.

This process of combining and unscrambling the signal plus the lower tolerances used in the manufacture of TV tubes means that any signal produced by a modulator will have lost some of the crisp resolution of the original signal. This is most noticeable with serious software such as word processors, databases and spreadsheets that display an unmoving picture. Games and fast moving colourful displays aren't as noticably affected.

■ HELP! Cake and eat it

I've recently sold my half share in a Amstrad PC1640 which I had for several years and have been scanning the pages of *Express* for a new computer. Now I'm a little confused and was hoping you might be able to help.

What I'm after is a machine on which I can do word processing and spreadsheet work, have the facility for playing games of an Amiga 500 standard and have PC compatibility if possible. Can the Amiga 1500 or 2000 do this? Or can I go for the cheaper option of the A500 with a PC emulator? What is an emulator? Is it the same as PC compatible? If so can I run some of my old PC software on it? I told you I was confused! Please help.

Alex McNab, Harrogate

I would have thought that an Amiga 500 running a database, word processor and spreadsheet would have fitted the bill, but if you must have PC emulation as well, the ATonce board or the KCS Power PC will turn your Amiga A500 into a PC. The display will be limited to CGA but that isn't normally a problem with serious software.

■ HELP! Three sheets

I am a student at a secondary school doing my GCSEs and I am in need of a good spreadsheet, preferably one which can read in Lotus *1-2-3* or *Multi-plan* files for various pieces of course work I have to do. I also need the ability to draw graphs from spreadsheet data. Can you recommend a package to me which has these features or two separate packages (one for the graphics and a spreadsheet) which can do the job well. I own a Amiga 500 with one extra disk drive, 1Mb of RAM and an LC-10 printer. I would be very grateful if you could help me choose the right package.

Philip Chung, Cheltenham

If you want to use an Amiga to import PC files, you'll either need a utility that enables the Amiga to read PC disks or the ability to use comms software to transfer the programs down the serial port. *CrossDOS* is a software solution that will allow you to read PC disks on the Amiga. Alternatively, you could use a PD comms program such as *Access* to connect to a PC via the serial ports or remotely using a modem. Once you've sorted out which way you you are going to transfer the data, you'll probably have your work cut out trying to find total PC file compatibility with an Amiga program. You could do worse than to contact an Amiga public domain library for the necessary programs.

If, as a student, you find that cash is in short supply, the cash wise PD solution should see you through and you may be surprised at the quality of software that is available to be freely distributed. PD libraries are easily found advertising in the pages of Shopping Express.

■ HELP! No manual

I am desperate, and unsure which way to turn. I have just bought an Epson PC AXZ with 20 megabyte drive and mono screen from bankrupt stock, with a copy of Smartware II, all originals. To make full use of my system, which I will be using for an OU course starting at the end of February I, of course, need a printer. I have therefore decided to use my trusty old DMP-2000 (Amstrad) which up until now I have been using with a CPC6128 and a BBC B. I have bought a parallel printer cable (Ledax LL331) but have been unable to get the system to work. This must just be a cable fault, can you give any suggestions. Because the computer was bought from bankrupt stock I only received a bare minimum of manuals. If you could please steer me towards a manual, textbooks or supplier of information, I would be most grateful.

Phil Nelson, North Tyneside

If your printer is still working properly with the CPC and BBC then it suggests that it may be the lead. The DMP2000 is a simple dot matrix printer that is Epson Compatible. Before you throw away your leads, make sure that you are running PC software that is configured to drive an Epson. The DMP2000 doesn't support the IBM extended character set, but that shouldn't be too much of a problem if you only want basic output.

I connected the office DMP2160 (same printer but slightly quicker) on to the back of a PC, Amiga, ST and Archimedes and got acceptable results. If it isn't the printer driver or the lead, it might be a configuration problem. PCs can have more than one parallel port. (LPT1, LPT2 etc). If you're set up to print through LPT2 and your parallel port is LPT1 you'll get no result either. If all else fails, get in touch with your local PC user group. Like all similar clubs, they're bound to have someone who's run into a similar problem and can help you.

■ HELP! Transformer

Can you please help? I am trying to find some information on the *Transformer* emulator to run PC software on the Amiga 500. I have just been in touch with a PD library and they told me you did an article on this about six months ago. Since I have only been buying *Express* for the past three months I missed out.

Glenn, Somewhere

The *Transformer* is a software PC emulator for the Amiga that I haven't seen around or advertised for some time. And a good thing too. It was shaky at best and while it would occasionally run well-behaved PC software at a snail's pace, it was of not much practical use.

In order to successfully run PC software on an Amiga you will need at least a hardware emulator such as ATonce or KCS Power PC. ■

■ HELP! PC Archimedes

Just a few lines to say I am whole heartily pleased with your magazine although I would like more support for Archimedes owners such as myself.

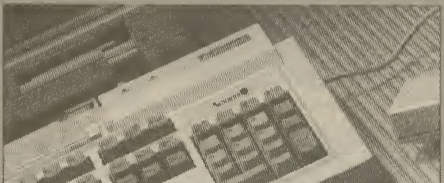
Are there any plans to release a new version of Acorns PC Emulator? At the moment I am studying a BTEC National Course in computer studies and am hoping to progress to a degree course, I would like to know if there are any 286 or 386 PC emulators available or being developed for the Arc. I feel rather jealous of both the Atari ST and Commodore Amiga which have both these emulators available (in the form of an hardware/software solution like ATonce by Vortex), I have acquired an Archimedes and need at least a 286 emulator for my degree course and cannot afford the further cost of a PC. Surely if an Amiga can emulate a 286 PC the Archimedes should have no problem as it run four to five times faster than the Amiga. Could you please look further into this and advise me as to what I should do.

I would also like to give a note to software houses who ignore the Archimedes completely. DON'T. This machine is far more powerful than the 16-bits and offers improvements in both the sound and graphics department. The sound consists of eight channel stereo (compared to the Amiga's four and the Atari's disastrous three) and the Archimedes has a proper 256 colour mode which may be used for games (unlike the Amiga's 32 and the Atari's 16). I don't want to get into the MCIBTY debate, but if the hardware is superior why not use it instead of ignore it completely? I look forward to more software and hardware projects for the Archimedes range of machines.

Sunny , Yorkshire

Sunny Yorkshire? Come on that must be a joke. The last time I set foot over the Pennines from my native Lancashire, (and all previous sorties into white rose territory) were greeted with torrential rain.

The chaps at Acorn tell me that their policy with software is to continually look for ways to improve, revise and upgrade but that the Acorn PC Emulator will remain an XT clone for now. With a hardware based emulator such as the ATonce or the KCS Power PC board, all of the hard work is done on the emulator which is in real terms a PC on a board The PC work is done by the emulator and then passed on to the I/O of the computer. This gives the emulators on the ST and



Amiga a speed advantage of running a PC that not even the whizzy Archimedes can catch with its software only emulator. For an emulator on the Archimedes to become faster than the ATOnce or power PC board, it would have to be a hardware based emulator. Alas, as of yet none exists.

Your comments about the abilities and specification of the Archimedes are true, but it hasn't yet caught the attention of the software houses or the general public. I think that this is partly due to it being perceived as an educational machine and not as a piece of kit to aspire to if you've got a spare wadge of cash. Its price doesn't help either, but in me, you're preaching to the converted – I am a lifelong fan of *Zarch, Conqueror* and *Interdictor.*

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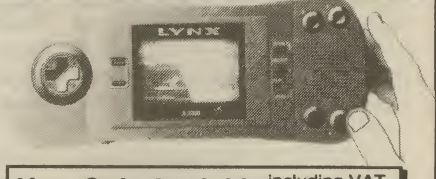

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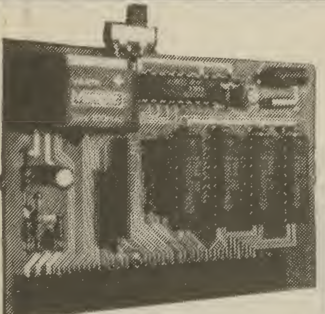

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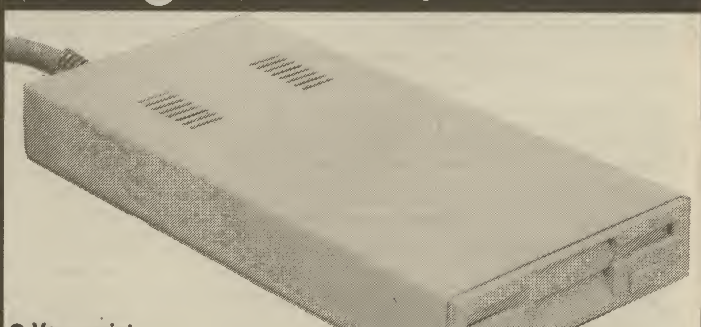

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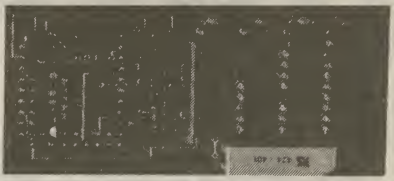

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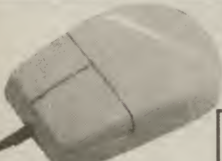

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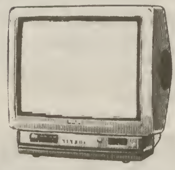

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WHOLE WIRED WORLD

Steve Gold reports on the new generation of video games.

MOVIE QUALITY ARCADE GAMES

Just when you thought it was safe to go down the video arcade comes news that Data East, one of the major video games suppliers in the US, has licensed Intel's Digital Video Interactive (DVI) technology on an exclusive basis for arcade games.

According to Data East, of San José, California, the Intel chipset – DVI 1750 – will be used to produce "graphically sophisticated coin-operated video games with animated imagery that approaches film quality."

And we can expect to see these 50 pence piece gobblers down at the local arcade sooner than you might expect. Data East reckons it will have several new games out by the Spring.

Joe Keenan, Data East's president, believes the arcade games will be second to none in comparison to existing arcade game technology. "For the first time, arcade games will have graphics with the intensity, depth and realism of film animation. Players will have the sensation of being inside the game as never before," he said.

For the couch potatoes among you, Intel is reported to be talking to Commodore regarding using its arcade game technology with the soon-to-ship Amiga CDTV system. Watch this space.

1MB STE DEBUTS IN CANADA

In a surprise move, Atari Canada has launched a 1Mb version of the Mega STE. While the machine only has a floppy drive, it is fully upgradeable to the 4Mb version with hard disk, according to Ron Kovacs' *Z-Net* newsletter.

The scene-stealer is the machine's price. The 4Mb Mega STE, with 50Mb hard disk, retails for US$1,295 including monochrome monitor. That's the equivalent of around £700 at current exchange rates, and significantly less than the US$2,495 that Atari sells the 4Mb version for in North America.

As *Z-Net* reporter Terry Schreiber says: "I'm sure that somewhere around, someone will find 4Mb of SIMM chips and a 50Mb hard drive," for the cost difference between the two machines. At £700, the 1Mb Mega STE makes even the budget Apple Mac Classic's pricing look a bit on the high side.

WORDPERFECT FOR PORTFOLIO

While WordPerfect UK has announced that a £425 ROM card version of *WordPerfect* 5.1 is available for users of the Poqet pocket PC, innovative Atari Portfolio users are running *WordPerfect* on their machines. According to the *ST Report* newsletter, several users of the pocket PC have been using *WordPerfect Junior* to great effect on the machines.

While *WordPerfect Junior* isn't now available on either side of the Atlantic, *WordPerfect Executive* – which includes the basic program along with a calculator, calendar and other *Sidekick*-style extras, plus *PlanPerfect* 3.0 – is available. This will, says *ST Report*, run on the Portfolio.

Of course, this still stops short of *WordPerfect* releasing a version of its word processing software specifically for the Portfolio. But since it's done this for the Poqet, there's a good chance it will so the same for the Portfolio, especially if Portfolio users let the company know their requirements!

24-BIT ART FOR AMIGA

ASDG of Madison, Wisconsin, has announced that *Art Department Professional* for the Amiga is now being shipped.

The package is the latest release in the *Art Department* range, and is a professional image processing tool for use on all Amigas. So what's the difference between *Art Department Professional* and the rest of the 'paint' programs for the Amiga?

ASDG's offering is 24-bit, that's what. In simple terms, this means that *Art Department Professional* can support up to 16.7 million colours on-screen at any one time. Having this many colours on-screen would, of course, make the image look a mess, but it does give the user a considerable degree of flexibility in painting terms. It also allows rapid manipulation of imported file images.

The real power of *Art Department Professional* lies in its ability to rapidly load and display images in its memory. This means that true animations of images are possible, something that is usually only possible on the most powerful 486-based machines.

What's most interesting about the $240 package is that, although it's aimed at the serious user of graphics packages for the Amiga, it is flexible in its system requirements: the software will run equally well under Kickstart 1.2, 1.3 or 2.0 on the Amiga, and runs in as little as 2Mb of RAM.

ASDG does recommend, however, that Amiga users run the package in 4Mb of RAM to save on writing and loading portions of the screen to and from disk. Existing users of *Art Department*, ASDG's original Amiga graphics package (which is still available) can upgrade to the professional version for $125 plus $5 for postage and packing. Contact: ASDG Incorporated, 925 Stewart Street, Madison, WI 53713, United States. Tel: 0101-608-273-6585.

APPLE MAC SALES SURGE AHEAD

Apple's chairman John Sculley has reported that sales of the Mac Classic have gone through the roof, exceeding all expectations since the machines were launched last October.

"Our strategy to significantly increase the installed base of Macintosh users by offering the computers people want at more affordable prices is clearly working," he said when announcing Apple's first quarter results. Sculley also revealed that sales of the Mac are currently 50 per cent higher than this time last year, something he attributes to the success of the Mac Classic.

Sales of the LC and IIsi, the other two machines in the new Mac range, have yet to filter properly through to the quarterly figures, so the sales potential is vast. Sculley said he is "confident" of Apple's prospects for the rest of the year 1991, noting that "we have a number of important new products in the pipeline." What new products? The Supermac is one: a 68040-based machine scheduled for launch in the second quarter of this year. ■

THOSE TOS ERRORS REVEALED

A complete list of undocumented Tos errors on the Atari ST has been compiled by users of Genie and Usenet.

The list is based on a basic list published by *Current Notes* magazine in 1988, which has been enhanced by a long list of users. *Current Notes* can be contacted at 122 North Johnson Road, Sterling, VA 22170, United States for further information.

According to Ron Kovacs' Z-Net newsletter, the error list is not official, since it has not appeared in Atari's official documentation for the ST. Still, as he says, it's the most complete one available to date.

Error description	Return code	Alert box
OK (no error)	0	
Fundamental error	-1	
Drive not ready	-2	
Unknown command	-3	
CRC error	-4	
Bad request	-5	
Seek error	-6	
Unknown media	-7	
Sector not found	-8	
No paper	-9	
Write fault	-10	
Read fault	-11	
General error	-12	
Write protect	-13	
Media change	-14	
Unknown device	-15	
Bad sectors on format	-16	
Insert other disk	-17	
Invalid function number	-32	1
File not found	-33	2
Path not found	-34	3
No handles left	-35	4
Access denied	-36	5
Invalid handle	-37	6
Insufficient memory	-39	8
Invalid memory block address	-40	9
Invalid drive specified	-46	15
No more files	-49	18
Range error	-64	33
Internal error	-65	34
Invalid p'gram load format	-66	35

Those bombs that appear on your screen are error messages from the 68000 microprocessor:

Description	Number of bombs
Reset: Initial PC2	1
Bus Error	2
Address Error	3
Illegal Instruction	4
Zero Divide	5
CHK Instruction	6
TRAPV Instruction	7
Privilege Violation	8
Trace	9
Line 1010 Emulator	10
Line 1111 Emulator	11
Unassigned	12
Unassigned	13
Format Error	14
Uninitialised Interrupt Vector	15
Unassigned	16-23
Spurious Interrupt	24
Level 1 Interrupt Autovector	25
Level 2 Interrupt Autovector	26
Level 3 Interrupt Autovector	27
Level 4 Interrupt Autovector	28
Level 5 Interrupt Autovector	29
Level 6 Interrupt Autovector	30
Level 7 Interrupt Autovector	31
Trap Instruction Vectors	32-47
Unassigned	48-63
User Interrupt Vectors	64-255

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AMG-148: BUSINESS 2 - VC Spreadsheet clone. Excellent!!
AMG-142: MCAD - A full featured CAD program. (1 Mb)
AMG-129: BUSINESS PROGRAMS 1 - Includes address book, mail manager, label printer & more.
AMG-149: WORDWRIGHT - Word processor with spelling checker.
AMG-216: ULTRA PAINT - An excellent painting program with many capabilities.
AMG-158: AIRWAR - War version of 'Flight Simulator' with 3D graphics.
AMG-161: BATTLEFORCE - Ideal for battletech players. Up to 4 players can play each other or against the computer.
AMG-215: CASINO GAMES - Many fun card & casino games with documentation.
AMG-159: STAR TREK THE GAME - Featuring digitised sounds (1Mb + 2 drives required).
AMG-176: HORROR DEMO - Exploding head, dismembered arms. 'X' rated.
AMG-182: TOILET PAPER AD - Amazingly funny demo with digitised speech. 'X' rated.
AMG-183: SAFE SEX DEMO - Another fantastic digitised demo. Collectors item!!
AMG-171: DELIRIOUS 1 - Eddie Murphy at his best. (2 disks).
AMG-173: DELIRIOUS 2 - More from Eddie. (2 disks).
AMG-199: MONTY PYTHON - 'The Secret Policemans Ball' digitised.
AMG-261: THE WALL - Digitised 'Pink Floyd' song.
AMG-507: BLOW FLY - Another digitised speech demo (really funny). 'X' rated.
AMG-520: LAUREL & HARDY - digitised animations of the duo
AMG-515: SCANNERS DEMO - Not for the squeamish. 'X' rated (1Mb recommended).
AMG-501: BUDBRAIN DEMO - Must be one of hottest demos of the year. 'X' rated.
AMG-264: FANTASY SLIDESHOW - 17 great fantasy pictures in digitised HAM format.
AMG-265: FANTASY SLIDESHOW 2 - 14 great images in HAM 4096 colour mode.
AMG-282: VALLEJO ART 1 - 7 of the best digitised pictures in interlaced HAM mode by Boris Vallejo.
AMG-283: VALLEJO ART 2 - Another great collection of Vallejo's artwork.
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ST

ST-151: BOLO - An incredible 'Breakout' game. Excellent graphics & gameplay!
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ST-111: GAMES 15 - Cribbage, Blackjack & Stud Poker.
ST-108: GAMES 12 - Tennis, American Football, Darts & more.
ST-107: GAMES 11 - Monopoly, Othello, Yahtzee & Backgammon.
ST-112: GAMES 16 - Taipan (rule the seas in the 1800's), Trucker (18 wheeler simulation) + more.
ST-102: GAMES 6 - Wheel of Fortune! The game.
ST-304: PLANETS - A guide through the solar system (DS drive).
ST-305: PLANETARIUM - An excellent program. In the top ten PD of 1990.
ST-596: OPUS- The BEST spreadsheet on ST (1Mb).
ST-197: ST WRITER ELITE V3.8 - The best PD word processor on the ST today.
ST-004: VISICALC CLONE - A VC spreadsheet with manual
ST-580: WHAT THE BUTLER SAW - 'X' rated animations.
ST-575: MADONNA - Slideshow of Madonna nude. 'X' rated.
ST-439: ROBOCOP - The best Robocop demo yet (2 DS + 1Mb).
ST-449: PREDATOR - Featuring excellent animation & digitising.
ST-438: SCANNERS - Exploding head. Not for the squeamish. 'X' rated (DS 1Mb).
ST-437: TOILET PAPER AD - A classic demo featuring digitised speech. 'X' rated.
ST-316: STAR TREK - The ultimate Star Trek demo (DS 1Mb).
ST-417: WHEN HARRY MET SALLY - Animation from that classic scene in the film.
ST-268: DELIRIOUS - Eddie Murphy at his best (2 x DS).
ST-372: RAW - Eddie Murphy again!! 'X' rated.
ST-316: THE RUN - Classic animation featuring a police car chasing a criminal.
ST-312: WALKER 1 - That classic animation of the AT-AT walker from Star Wars.
ST-278: CALIFORNIA RAISINS - Excellent animated demo featuring those raisins singing 'I heard it through the grapevine'.

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Access

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OPENING TIME

A few friends sat down last week, I went too, and tried to tell some computer jokes. They came up with "How many programmers does it take to change a lightbulb?" – see the Tosh Forty for the answer– and that was about it. Why was this?

According to a rather irate telephone call I received recently it is because: "Computing is just too important to joke about!" Can this be true? Are there no jokes lurking around out there with which to liven the vaguely humourless world of the microchip. Is computing too serious, too important, too straightfaced to joke about? I hope not.

SULKS AND VITRIOL

My spies tell me that just last week a software house, which I will not name, sent two people around to "visit" a couple of our sister magazines.

The mission of the reps was to complain about a bad review a game had received. They had taken large quantities of umbrage as well as spending even larger amounts of dosh on the licence. Things stayed rather, shall we say frosty with implications such as the original game from the States was poor in the first place, so the conversion had been difficult – tell that one to the kids who paid £24.99 for it pals – and that it had been slated because of its subject matter, rather than because it was a poor game. The final damning aspect was that not even the software house thought the game was worth over 50 per cent. Now how would Rolls Royce have lasted so long if it knocked out a Bronze Shadow which was "OK really"? I'll keep you informed.

LOOK AND FEEL

Try this for an interesting hypothetical situation which might look good in Paperback (sic). A colleague of mine got her haircut last week. She was going to America and wanted to get a coiffure in the style of some starlette – Kylie Mills or Haylie Minogue I forget which, to impress her hosts.

So, she got the cut, the plane tickets and the little piece of paper which said that she had never been a member of the Communist Party and that she knew that Joe Montana was the quarterback for the 49'ers, and off she went. All well and good until she got on the plane. Also travelling to the USA was a lawyer who worked for the starlette who's hairdo the colleague had emulated.

"Hold it right there missy. I hearby issue a writ for look and feel. You are attempting to take hard earned wages from my client by adopting that haircut!" says the lawyer

"Oh bugger. It's a fair cop guv. You had better drag me through the courts for two years for my crimes," says the young lady. Silly isn't it?

Tim Smith's CEN

Write to 30 Monmouth Street, Bath BA1 2BW (do the dongle)

QUICK QUIZ

Five questions to pass the time while waiting for a Sierra game to boot. Answers at the bottom of the page

1) What does JCL stand for?

2) What does FORTRAN stand for?

3) What does VLSI stand for?

4) Which software house markets Windows?

5) Was does CP/M stand for?

LETTER SPRAY

More thoughts from your side of the page. Letter Spray gives you the chance to complain, berate, offer constructive criticism or be rather, well, silly. You remember ... like you used to be when you were young and carefree.

Dear Tim,
What happened to all the prize winners then matey?
Yours JP Morant, Clerkenwell, London.

Dear JP,.
Erm, well, yes.... due to the fact that the number of competition entries has been less than the number of people offering to take me out for a free lunch, I have decided to hold back declaring winners until I get a suitably decent amount. Seeing as you ask, I will declare all winners next week. If you all have any ideas for comps please write and tell me.

Dear Mr Smith,
I would like to contribute to the plug and electronic equipment debate which has been raging in these pages. The only problem is that I can't think of anything worth saying except "Wiggle wiggle moo moo garoooo schmooo balooo DIP!"
Yours, Bart Simpson's math teacher, Elsewhere

Dear Mr Bart Simpson's mathS (sic) teacher,
That's a damn sight more constructive than the assistant in one of my local consumer electronics stores. Thanks.

FACTS ALOT

Seymour Papert, the man who invented the Logo programming language, set much store by the work of Jean Piaget. Piaget once studied a snail which lived in Alpine lakes, and he theorised that the shell shape derived from the harshness of the environment.

The etemology of Algebra: Based on the name of Arabian mathematician Hisab al-jabr W'almuqabalah.

THE GEEK

IT'S ALL GEEK TO ME

This week.... he bought a new kettle lead, and boiled his 286 dry.

FROM THE ARCHIVE

What on earth happened to the Archive last week? If you've only just started to read the mag you won't care. If you've been reading for years, you were probably worried sick. But never fear, it has returned. And it seems to be a good idea to look back at what was happening last year when countries were freeing themselves and everybody wanted to be friends.

POWER LINES MIGHT KILL

Express looked into a report which claimed that radiation emitted by computers and other electrical appliances could cause leukaemia, miscarriages and cot death. Not only that, but overhead power lines kicked out just as much radiation – viewers of *Brookside* will be familiar with this argument.

SHOOT FROM THE LIP

"I know people will say that they've heard it all before...." Steve Franklin of Commodore on the firm's latest PC initiative.

HIGH FLYERS

The Civil Aviation Authority decided to start training new pilots using simulators running on Amiga 2000s. 24 Amigas were installed all of which were to use touchy screen technology. Although the software wasn't known, speculation was that it could be *Falcon* from Mirrorsoft.

SAM SLIPS A DISK

Miles Gordon Technology (gawd bless 'em) announced an ultra-slim 3.5-inch drive. The drive was designed to fit into the port at the front of the Coupé. Priced at £89.95. MGT said that the drive would "put the Coupé way ahead of its 8-bit rivals".

A NICE COLD EMMA-NA

Emma Nicholson MP was all set to include computers in a new 'Disaster Bill'. The campaigning member had plans which could have made backing-up of data a legal necessity. The idea was that computers linked to hospitals, banks and the military among others should be legally protected.

ANSWERS: 1) Job Language Control 2) FORmula TRANslation 3) Very Large Scale Integration 4) Microsoft 5) Control Program for Microprocessors

NTREFOLD

HARWICH MAN TO WED COMPUTER, SHOCKER

A CENTREFOLD EXCLUSIVE

• *An ST 520 wedded bliss or a life of sexual confusion?*

In a mildly shocking, and sort of precedented act of faith in artificial intelligence, Mr Orville Canton-Briggs of Harwich – the gateway to Holland – held a press conference in his kitchen last week and said that he would marry his ST in August if the weather held out.

"My ex-wife was forever telling me that I loved my 520 more than her. She also pointed out that I spent more time with it than with her and our two children, Thingummy and Wossisname. It took a few years but I finally came round, one day last April I realised that she was quite correct. Our divorce came through last Tuesday. I proposed to RAMmikins (the ST) on Wednesday and it accepted soon afterwards. We're very happy."

It is not known what the legal implications are as the only lawyer we could get to comment was a Poll Tax specialist. He, Sir Peter Blindemwithjargon, said: "I don't know what the legal implications are here but as far as can see it's all a bit bloody seedy. Now give me my £2k and bugger off you horrid oik."

The only precedent we have been able to trace is that of a Professor FA Zeigermeyer III Jr of MIT who took an Apple II as his common law spouse in 1977. This ended in tragic heartrending disaster when the Professor was caught in flagrante delecto with a PC XT in 1985. Zeigermeyer has since been sued for $3,000,000.

When we asked Mr Canton-Briggs if he thought he was verging on the mental–as–a–caboose–full–of–sun–stroked–koalas he commented: "Love is a strange and wonderful thing, fa-la-la, hello trees and would you like to feel my spout?"

The perfectly formed 520 refused to make any statement but sat on a desk glowing brightly.

FACTS ALOT

There are 8008 ways of assigning 4-bit code words to the set of ten decimal numbers.

Ada, a language developed in 1979 under the guidance of the US Ministry of Defence, was named after Lord Byron's only legitimate daughter, Augusta Ada.

FACTS ALOT

The first verison of UNIX was developed at Bell Labs and was released in 1971.

According to John Lamb in the *New Scientist* 21 February 1985, there were 2,200 on-line databases available to the public that year.

T-⊕-SH 40

Here we go with four more groups of ten easily digestable – and computer related – bits and bobs for you to discuss at the next meeting of Wireheads Save the World.

TEN POSSIBLE ENDINGS FOR THE "HOW MANY PROGRAMMERS DOES IT TAKE TO CHANGE A LIGHTBULB?" JOKE....

1) None, it's a hardware problem!
2) 236. One to change the bulb and 235 to "tweak it a little".
3) None. The concept's far too unorignal man.
4) One and a lawyer. The programmer changes the lightbulb, the lawyer defends him in the ensuing look and feel case.
5) 73. One to change the lightbulb. One to provide the vertical (ladder) scrolling. One for the collision detection. One for the music... etc, etc.
6) One. But only after the system analyst has checked out the scenario.
7) Two, a lightbulb house and a lawyer. The lightbulb house buys the bulb from America. One programmer tweaks it for the British market, the other changes the title. The lawyer defends them all when it explodes.
8) None. Nintendo won't let them
9) Three. One to find out if it's dark. One to find out if it's the lightbulb that's gone. One to change it.
10) 2,000. One to change the lightbulb and 1,999 to hold a dinner and give him or her a prize.

TEN TRANSLATIONS OF GAME REVIEWS

1) If you like shoot-'em-ups then this is your kind of thing = *bog standard and I can't think of anything else to say.*
2) It goes without saying that = *I'm getting paid by the word for this rubbish*
3) Superb graphics make this game = *that's if you take no notice of the appalling game play.*
4) It'll be a smash = *it's a major film licence*
5) A poor attempt = *I didn't get invited on the last free trip to Bruges*
6) A little unoriginal = *what more can you say about a game called Invaders from Space?*
7) More blood than a Shakespearian subtext = *aren't I a clever dick?*
8) A good coin-op conversion = *so my little brother tells me*
9) An excellent arcade conversion = *as above*
10) Without doubt, and far from stretching a point, not to beat about the bush = *I'm still getting paid by the word for this.*

TEN TRANSLATIONS OF HARDWARE REVIEWS

1) Did well benchtest wise = *it still worked after we dropped it on the desk.*
2) Incredibly fast = *the pop-up menus disappear before you get a chance to read them.*
3) Excellent expansion possibilities = *no hard drive. One 5.25-inch floppy. No monitor. Will just about take a colour video card, and I like the PR girl.*
4) The nnMHz clock speed compares well with the PCff's nnMHz clock speed but show poorly against the PCgg's nnMHz = *used a lot of PCs haven't I?*
5) There's computers and then there's computers and this one... = *I'm getting paid by the word for THIS too*
6) Too much store is set by speed so we won't consider it in this review = *it's a crock of CENSORED but I still fancy the PR girl*
7) It may be good but there's still nothing to beat the PCxx = *that's what I've been using for the last two years and I'm not changing now*
8) As a printer it leaves a great deal to be desired = *I hope no one asks me what it's like as a vacuum cleaner*
9) Elegant = *black and expensive*
10) Clumsy = *cream and cheap*

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4) Would the manual for my NeXT machine fit in your handbag?
5) I've got a huge disk.
6) Have you got any Pascal in you? Would you like some?
7) Come back and see my scrollings?
8) We could make wonderful MIDI together
9) My assembler doesn't understand me.
10) Your eyes remind me of the LEDs on my hard drive.

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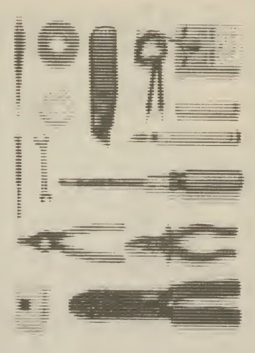


The saga of the breadboarding project continues with all the bits and pieces you need to collect to make the right connections.

After last week's trip back to elementary woodwork, it's time to start thinking about adding components to the breadboard project. The breadboard is a multi-use board with components attached that can be connected together in different ways to provide different circuits.

The inspiration for the breadboard project came from the Tandy 130 in one project lab that we looked at a few weeks ago.

Unlike the Tandy kit, the breadboard project is designed to be a completely modular system that can have extra boards added at any time. The first board is a power board designed to carry batteries but with enough room for a later upgrade to a mains tranformer power supply.

Later modules will allow the use of integrated circuits, processors, ROMs and EPROMS.

COMPONENTS ON YOUR BOARD

Resistors – The resistors in a circuit predictably resist the flow of electricity. A resistor is measured in ohms. Simply, the larger the figure, the greater the resistance. Resistors with high values are abbreviated. 1,000 ohms can be abbreviated to 1k ohm. For this project, resistors with values of between 100 ohms and 470k ohms are of use. It is possible to create greater resistances by connecting resistors together in series.

Values in ohms – 100, 470, 1k, 2.2k, 4.7k, 10k, 22k, 47k, 100k, 220k, 470k.

Capacitors – A capacitor can allow AC signals to pass through and stop DC. Alternatively, it can be used to accept and store electricity up to its pre-determined level. A third use is as a filter in order to 'clean up' and smooth electrical signals with unwanted pulses and spikes. The value of a capacitor is measured in farads. The farad is a large measure of electricity so often the capacitor's value will be given in micro farads. A microfarad is one millionth of a farad. The value of a capacitor tells us what the capacity of it is. It may help you to think of farads to a capacitor in the same way that you might think of fluid ounces in a pint. The larger the amount of farads, the more a capacitor can hold.

A simple rule of thumb with capacitors is that the smaller ones are often used in applications with very high frequency. This could be as part of a radio receiver or transceiver or a signal controlled oscillator. Larger capacitors are used to store electricity of filter currents.

Some capacitors can only be placed in a circuit one way round. If a capacitor is marked with its polarity this should be taken into account when placing it in a circuit.

Values in farads – 10pF, 100pF, 0.001µF, 0.01µF, 0.02µF, 0.05µF, 0.1µF, 3.3µF, 10µF, 100µF, 470µF.

Diodes – A diode has many uses in electronics. Its major characteristic is that it will only allow electricity to flow through it in one direction. This can be used to protect components that could be damaged by a change in the polarity of the current. Another use is rectifying current. This means taking a signal of alternating current and changing it to direct current. One of the most common circuits using diodes is the full wave bridge rectifier which uses the 'one way street' feature of four diodes to change AC to DC.

Other useful diodes are light emitting diodes or LEDs. These produce light without a large overhead of power and are ideal to place in a circuit as an indicator that something is happening. Like regular diodes, LEDs can only pass current in one direction so they are useful as indicators in circuits where the direction of the current can change. An example of this is a model railway layout where the direction of the current, and consequently the trains, could be monitored from a place where they couldn't be viewed.

Diodes – 2 x germanium, 2 x silicon.

Transistors – The main use for transistors is to amplify signals. The most common transistors are a tiny chip of either silicon or germanium which are the most common semi-conducting material.

As well as amplifiers, transistors can also be used as electronic switches and components in a pulse oscillator.

Transistors – 2 x PNP, 2 x NPN

Once you've added the components to your board, it's a good idea to purchase one of the project kits from Tandy as source material for your first few circuits. Each of the Tandy project kits come with a book that explains what's in each project and how to put it together. This way you can work in tandem, building the circuit on the kit and on your own breadboard.

You can get in touch with Tandy by telephoning 021-556 6101.

OTHER COMPONENTS

- Switches – 1x key (Morse); 1 x momentary turret; 1 x 2 pole 2 way
- Variable resistor (rheostat)
- Light sensitive (CdS) cell
- 4 x light emitting diodes (red)
- Small speaker (of the size found in a pocket radio)
- Tranformer for speaker

Components to add later on other boards:

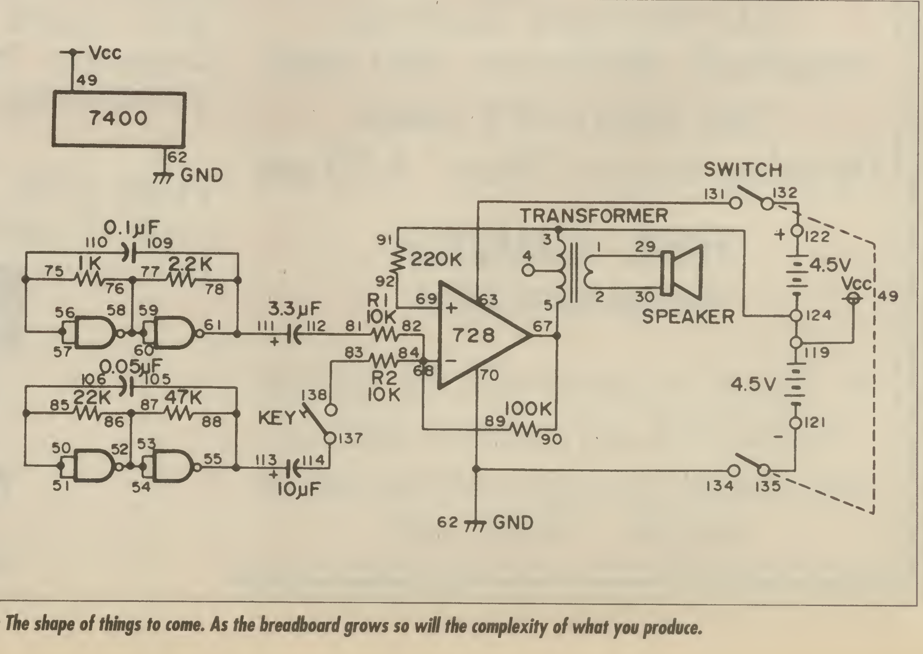
- Graphite antenna
- IC amplifiers
- IC gates (AND/NAND etc)
- Radio tuner
- Processor chip (Z80)
- ZIF sockets ■

GOING UP THE WALL

As a space saver, it's easy to mount your breadboard project on the wall. As the project is in modules, it's important to be able to remove and rearrange them for work on the bench or to place them in a different order for different constructions. I found the simplest way to wall-mount the whole thing was to prepare a baton 2 inches by 0.75 inches by a suitable length.

I had 6 feet of available wall space so mounted two batons. One was 5 feet 6 inches from the floor and the other at 4 feet from the floor. With a main module size of 2 feet by 1 foot 6 inches, the two batons could accomodate up to six boards. The batons were drilled and countersunk from the rear and parallel 2 -inch threaded screws were inserted from the rear at 12-inch intervals. When the batons were attached to the wall the screws stood proud by 1.25 inches. The breadboards were drilled at 12 inch intervals too. The breadboards could be slid on to the screws and fastened in position with a nut.

This way they only take up wall space and are easy to arrange and re-arrange to suit specific circuits.



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THE PD COLUMN

After revolutionising your filing system and sprucing up your letters enjoy some animated fun and fine music. Adam Waring reveals how.

Hype! • ST (mono monitor) • South West Software Library • Disk 777

Hype! is a hypertext filing system which has the advantage over manual systems that you are not restricted to going through the records in a set order. Records can be linked together and at any point you may 'jump' to one of these attached pages.

A mix of text and graphics is allowed. Sections of the screen can be defined as 'buttons'. Click on them with the mouse pointer, and a new, out of sequence page is brought up. A button can be a square box with words inside, a picture or whatever you like really!

There is a set of 'hot-keys' for functions one through five. These include flipping to the next page, going back a page, printing out the screen, etc. You can also select many other options from the menu bar at the top of the screen.

It runs under the GEM operating system, so is easy-ish for the ST owner to use. You will need a mono monitor to make use of the program however, as it only runs under the Atari's high resolution mode. Each card is the size of the full screen, and can be displayed in its entirety. Displayed like this the option bar is lost, though, so you can if you wish just display part of a screen at a time.

There are plenty of potential uses for such a system. As well as keeping tabs on your club members, educational uses are ideal. The demo pages in the system show you a set of examples for suggested uses.

The Clip Art Collection • Amiga • Lorenzo's Domain • Disk 513

This is a six disk set containing hundreds of pieces of clip art. Pretty pictures, text fonts and icons are amongst the goodies to be found. All the images are stored as IFF format files, and so can be loaded into the vast majority of art programs, DTP packages, etc.

Uses for the package are varied. You could liven up your letters, or make your newsletter look more professional. At any rate, for the price (99p per disk from Lorenzo's), you get an awful lot of pixels for your pennies. Commercially available clip art collections could set you back many, many times the amount.

The Young Ones/The Holy Grail • ST • C Hack's PD • CH031/D

The two programs on this disk do roughly the same thing: they play sampled tunes from a couple of very well known cult comedies.

"Once in every lifetime/Comes a love like this..." sings the *Young Ones* demo. The sample lasts for about half a minute or so, and is crystal clear in quality. It's funny too, with all the whistles and sound effects from the BBC programme retained.

The Holy Grail is similar, but plays the *Round Table* song from the film. It's all jolly good fun, and both these programs are guaranteed to keep any Amiga owner amused for minutes.

WHERE TO GO

The programs I review in this column and many more besides, are available from the following PD libraries:

LORENZO'S DOMAIN
30 Colquhoun Square, Helensburgh,
Scotland G84 8AQ.
This Amiga library has a very 'clubby' feel. Competitions are run regularly, and it aims to send out your disks within a couple of hours of receiving your order. The disks are dirt cheap too. The princely sum of just 99p is all it costs for a disk full of delightful PD.

SOUTH WEST SOFTWARE LIBRARY
PO Box 562, Wimbourne, Dorset,
BH21 2YD
Large ST library with loads on offer. Send a jolly big SAE for the catalogue. Prices are £3 a disk, £2.50 for 4 or more.

Other great PD libraries to use include:

THE OTHER PD LIBRARY
108 Kenmare Road, Wavertree,
Liverpool, L15 3HQ. Tel: 051 734 4465.
Prices range from £2.50.

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681: AMI-FX ISSUE 1 3 DISKS (FRACTALS) (1 MEG MIN). £5.00
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706: 3 GAMES BY PH SOFTWARE. The TURN, TRICKY, MARBLE SLIDE. £2.00
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717: MUSIC DISK 53 tracks, 90 MINS! (For the collection). £2.00
727: SLINTERS TALE II Rude, but funny. (2 Disks/Drives). £3.00
728: UTILS The Famous BOOT-SHOP, BOOT-KIT + others. £2.50
740: MED V2.13 A TOP quality version of this FANTASTIC music utility, a host of new additions, including synth sounds. £2.50
741: NorthC V1.3 The VERY LATEST from Steve Hawtin, this set is on TWO DISKS, packed with extra examples & advice on bugs. £5.00
755: SUPER C COMMANDS FROM TWILIGHT (FASTER C DIR PROGS). £1.50
758: BOOTBENCH This one is packed with bootblock utils. £2.00
760: Letter writers disk, Set up and ready for your letters. £1.50
790: PROFESSIONAL SOUNDTRACKER V1.0 is here!, just press HELP key, whilst running, for full instructions, ALSO latest Ntracker V2.12, by Exolon And the FINAL version of DISKMASTER (V3), CLI TOOL. £2.50
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Echo Music VOl 1 • Amiga • Lorenzo's Domain • Disk 166

Seven songs are contained on this disk. They have been composed by a certain Mr Echo, a freelance computer musician who's using this disk as a vehicle to spread the word.

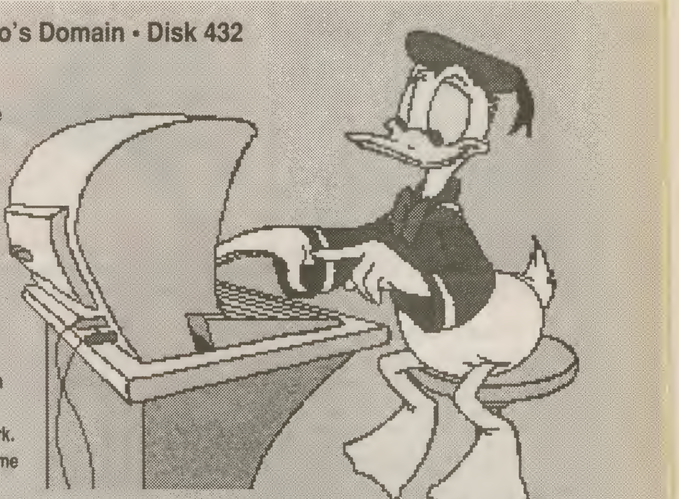
The songs have been written on *Noisetraker*, the famous PD program specially designed for composing tunes such as these on Amigas and STs.

All the tracks are quite long, and incorporate an abundance of digitised samples. Consequently they've been crunched quite dramatically, and take a few moments to decompress before you can hear them.

It's hard to comment on the music itself. I can only say that it's very well produced, but probably not the sort of thing I'd play on my hi-fi. Why not decide for yourself?

Oh, and by the way, should anybody out there require the services of a computer musician...■

Donald Duck Animation • Amiga • Lorenzo's Domain • Disk 432

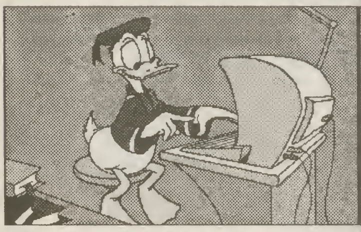


This has to be one of the best animations available in the PD scene. In case you hadn't guessed, it's based on Disney's world famous cartoon duck. It's a fairly short sequence, and only runs for around 15 seconds or so, but is of such high quality that it must be taking up every available byte of disk space.

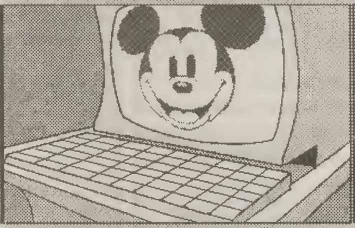
The sequence starts with Donald tapping away quite happily at his computer keyboard. His expression changes to one of suspicion, then outrage. The reason: Mickey's face has appeared on the computer screen! This is too much for Donald. In a terrible temper he pounds the computer keyboard and breaks the thing.

All this takes place in a matter of seconds, but it looks almost as good as the celluloid cartoons on which it's based. There are two versions of the same sequence on the disk. One is in black and white, and will run on any Amiga, while the other is in glorious technicolour, which needs an expanded machine to work. The monochrome version uses exactly the same drawings, but saves memory by only using one of the Amiga's bit planes.

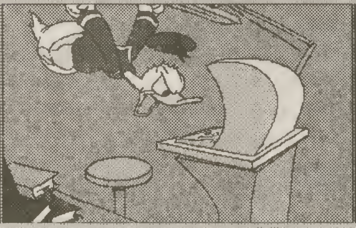
There's no sound in either version, which is unfortunate, as you can imagine that some digitised Donald quacks would enhance the excellent animation. Never mind though. I expect that the memory was jam packed with the graphics, and it's still an impressive program to have in your collection.



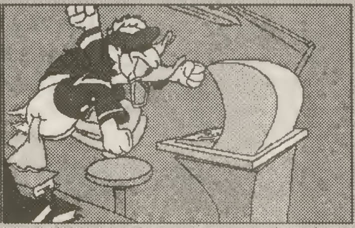
1) Donald waits in anticipation for the program to load...



2) Wait a minute... What's this?



3) Oh dear. That didn't go down to well.



4) That's one hell of a temper, Donald.

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CHOOSING A LANGUAGE

Mary Branscombe helps you make the right choice in the language you use for writing your program.

Now that we've seen the fundamental commands and structures that are needed to program in any language, we can consider the main points that you should bear in mind when choosing a language to write your program in.

If you are extending an existing application, you will have to work in the language used for the previous version, and if you are writing for a transputer, you will be using Occam. Otherwise, it will be up to you. The language that you know the best might not be the most suitable, and if you have to learn a language from scratch, you will have to take this extra work into account. It is easy to choose your 'favourite' language without considering if it is really suitable for the task.

BACK TO BASICS

As it is the application which will determine what you need from your language, you must, as always, analyse the problem fully. Before you can assess the suitability of a given language for your application, you need to know what sort of data it will have to handle and what constructions you will want to use.

You need to consider the type, the format and the origin of the data. If you are reading information from an existing database, a fourth-generation language such as SQL (Structured Query Language) will offer you high-level facilities for accessing the data, so that you may be able to write the application without needing to spend a lot of time on low-level routines to access the database and deal with the format of the data.

For other applications, ensure that the language offers you the simple data types that you need, as well as suitable structures for storing and manipulating data. If you want to process text input and output as a major part of your application, you may be drawn to a modern dialect of Basic, because of its ability to handle strings of variable length in the form A$="hello world". This compares to languages like Ada, Pascal, C and Modula-2 which treat strings of characters as character arrays of fixed sizes, so that either every string of text must be the same length, or a new array must be declared to hold every string of text, the lengths of which must be known in advance. Depending on your application, features like this may be crucial.

The language must also offer you suitable facilities for loops and conditionals, functions and procedures and any other constructs that you intend to use. As we have seen, the sophistication of the constructs available varies widely from language to language.

The modularity offered by the language can also be a factor in the decision, especially if you are working on a large problem that you want to break down into smaller subsections, or if you are working in a group. While Pascal and modern dialects of Basic offer various flavours and levels of procedure and sub-routine, languages such as C and Modula-2, which were designed to allow separate compilation of various modules which could be linked together, may be more efficient and offer better facilities.

This is a question of the methodology behind the language and this has more to do with the style of programming supported by the language than the explicit facilities offered. If you are writing applications in Artificial Intelligence, Expert Systems or Natural Language Processing, then you can write in procedural languages such as C and Pascal, but you will find the applications far easier to design in a declarative language such as Prolog or Lisp where the data representation is less restrictive.

Applications involving graphs and graph comparison and reduction especially are well suited to functional languages such as Miranda or Lisp. If you can decompose a problem into a hierarchy of processes, then a procedural language should be suitable. If the problem can more naturally be analysed into objects and the interactions between these, then an object-oriented language such as Smalltalk or C++ can be used, but it is worth remembering that object-oriented design is a programming methodology, not a solution in itself.

TOOLS

The division between compiled and interpreted languages is no longer absolute and compilers are now available for many languages such as Basic and Prolog that are better known as interpreted languages. The quality of the compiler and of the programming environment provided with it are very important. A good language should include a powerful debugger, an intelligent syntax editor and the compiler should return you to the editor when it encounters an error in the code, with the error suitably flagged.

The portability of the language may be relevant if you want to transfer your code to other platforms. Picking a widely available language that is considered portable will help, but even C is only considered perhaps 96% portable. Choosing an ANSI standard language is not a foolproof method either, as many compilers include 'extra' facilities.

A great deal of programming consists of solving the same problems again and again. If you do not have any code that you can reuse or adapt for an application, it is always worth checking to see if the algorithm you need is available in a code library. Fortran is one of the earliest programming languages developed, although a new standard with improved facilities has recently been agreed upon – Fortran 90. Fortran is not structured and the new facilities on offer may already be standard in many other languages, but the libraries of mathematical and scientific sub-routines written in Fortran have ensured its survival. If you can find a suitable library routine, your application may be half-written. ■

COMMON LANGUAGES

Most languages were written with specific applications in mind, or as tools for a particular methodology. You don't have to stick to the list, which shows only the most common languages, but you will be likely to find library applications in these areas for these languages.

Ada: defence software
AP/L: mathematical routines
Basic: simple beginners language - later versions are far more advanced
C: systems programming
C++: object-oriented extension to ANSI C
Cobol: data processing
Coral: real-time programming
Forth: similar to assembly language
Fortran: scientific and mathematical applications (FORmula TRANslation)
Icon: text processing
Lisp: LISt Processing, functional programming, AI
Logo: educational language, turtle control
Modula-2: general purpose and educational
Oberon: general purpose and educational object-oriented language
Pascal: general purpose and educational
PL/1: data processing
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Smalltalk: object-oriented language
Scheme: educational, functional programming
Snobol: text processing
SQL: database query language

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CPM & MSDOS Users Group – 42 Birkbeck Road, Wimbeldon, London SW19 9NZ. Tel 081-543 0824

CRYPTOGRAPHY & CODES - Mike Barlow, American Cryptogram Association 5052 Chestnut Avenue, Pierrefonds, Quebec HBZ 2A8 Canada

DATAEASE USER GROUP – High-Tech House, 10 Blackfriars Street, Norwich, NR3 1SJF

ECONET - Michael Ryan, Econet User Gp, Balkeerie Cottage, Eassie by Forfar, Angus DD8 1SR

DATA PD LIBRARY for Amstrad CPC users. Send SAE, tape/disk and 50p to Kingsmill 202 Park Street Lane, Park St, St Albans, Herts AL2 2AQ

DISABLED - Jeff Hughes, Special Needs User Group, 39 Eccleston Gardens, St Helens WA10 3BJ 0744 24608

DRAGON - Paul Grade, National Dragon Users Group, 6 Navarino Road, Worthing, Sussex or tel 0903 207585

EDUCATION - Charles Shannon, TECUG, 35 Wellington St, Gravesend, Kent DA12 1JG. Tel 0474 567 931

EIGHT-BIT BACK-UP 8-bit user group for all. 25p plus SAE. to: 8-bit back-up, 1 Northolme Close, Grays, Essex.

EINSTEIN - Graham Bettany, UKEUG 80 Dales Road, Ipswich IP1 4JR

EINSTEIN PD USER GROUP – Help and advice for all Einstein users. Over 100 disks of PD software. Send SAE to SW Knowles, 23 Howldsworth Rise, Arnold, Nottingham, NG5 8HZ

ELMSOFT PUBLIC DOMAIN SERVICE for the ST any weekend at Camden canal market, Haven Street, London

EMULATE. For Amiga, Amex. Monthly newsletter. Write to Pat 12b Northbrooks, Halrow, N Essex

ENTERPRISE – William Creaser, 6 Provident Street, Shaw, Oldham, DL2 8AQ. Independent Enterprise User group. Tel 0706 881382 from 7pm to 9pm

ENTERPRISE - Tim Box, Independent Enterprise User Group, 50 Holdenhurst Avenue, Finchley, London N12 0HX. Tel 081-346 8032

ENET (like Econet) - T K Boyd, Enet (Amcom) User Gp, Seaford Cottage, Petworth, West Sussex

EXMOORE SOFTWARE – Queen Street, Lynton, N Devon EX 35 6AQ

FIND YOUR LOCAL CLUB – British Association of Computer Clubs. Database of all user groups in the UK. Banc y rhosyn, 14 Bron Y Glyn, Bronwydd Arms, Carmarthen SA33 6JB.

FORTH Language - Douglas Neale, FIG (FORTH Interest Group) UK, 58 Woodland Way, Morden, Surrey SM4 4DS

FRACTALS/CHAOS THEORY - Andy Lunness, 69 Bronte Avenue, Bury, Lancs BL9 9RN. Telephone 061-764 6469

GENEALOGISTS - Computer Group, Society of Genealogists, 14 Charterhouse Buildings, London EC1M 7BA. 071-251 8799

GENERAL AMIGA – disk based magazine for the Amiga. Only £1.50 per issue. Send order to 19 Earn Court, Alloa, Clacks, FK10 1PT

GENERAL HOME MICROS - Steve Winter, Chic Computer Club, PO BOX 121, Gerrards Cross, Bucks SL9 9JP 0753 884473

GEOS USER GROUP – for C64 and 128 owners. Disk based magazine with PD tips, articles etc. Send blank disk to GUG (UK) 110 Deansway, Woodloes Park, Warwick CV34 5DQ

GUNNING PD ST PD – 47 Auchingane, The Tryst, Edinburgh, EH10 7HX

GUAGE - Martin Houston CUG (UK) Houston Technology Ltd, 14 Arden Oak Rd, Sheldon Birmingham BS26 3LX. Telephone 021-722 3168

HITACHI MBE 16002 PC - Bruce Ainge HICUPS 16 Nine Acres Road, Cuxton, Kent ME2 1EL. 0634 715759

HOUSING ASSOCIATIONS - Caroline Maries, Micro Users Ltd, Beaver Housing society, 23 Lewisham High Street, London SE13. Tel 081-318 1126

HEALTH WORKERS - Sue Mckendrick, Healthlink, 164 Windsor Rd, Ashton-in-Makerfield, Wigan WN4 9ES. Voice: 0942 712 385

IBM PC USER GROUP – PO BOX 360 Harrow HA1 4LQ.081-863 1191 BBS 081-863 6646

JOMAC USER GROUP – Spectrum and Amiga tips and pokes sent every month. Write with SAE to Jomac's, Filey Grove, Rhodes Street, Hull

JUPITER ACE – John Charter, Jupiter Ace Forth User Group, 17 Spring Wood Close, Dunston, Chesterfield S41 8BS. Tel 0246 237555

LA FANZINE – the ultimate disk fanzine. Only £2 including membership. L Stacey, 3 Norfolk Close, Bewbush, Crawley, West Sussex, RH11 8JG

LOCAL AUTHORITIES – Local Authority Micro User Group, John New, Borough Engineer's Dept, Municipal Offices, North Quay, Weymouth, Dorset DT4 8TA.. Tel 0305 785101 ext 272

LOTUS PRODUCTS - Lotus User Group, 79-80 Peascod St, Windsor, Berks SL4 1DH. Telephone 0753 841686

LYNX – R B Jones, Lynx User Group, 39 Ashton Close, Needingworth, St Ives, Cambs

LYNX DISK USER GROUP – J Koushappas. 172 Pasteur Gdns, London N18. Tel: 081 807 3859

MAC SOFT – six games for the Amstrad CPC6128. Send SAE, blank disk and 50p copy charge to Macsoft, 2 South Meade, Maghull, Liverpool, L31 8EF.

MEGADRIVE CONSOLE CLUB – Megadrive games new, old, bought, sold. Also exchange games. Andrew Stanford (0789) 764039

MEMOTECH FILE – 93b StJohns Road, Biddulph, Staffs ST8 6LL

MEMOTECH - Phil Eyres - Memotech Owners Club, 23 Denmead Road, Harefield, Southampton SO2 5GS. Tel 0703 585106

MICROSOFT WORD - Lesley Port, Folly House, Madeira Walk, Bachelors Acre, Windsor, Berks. Tel 0753 831001

MICRO-DESIGN USER GROUP – a new group for those PCW owners requiring assitance and advice with this DTP package. Large clip art library available. Phone Phil on 0709 543390

MID CORNWALL COMPUTER CO-OP – Atari ST. 8 Victoria road, Roche, St Austel, Cornwall PL 26 8JF. Telephone 0726 890473

MIDI/MUSIC – Spectrum music machine/MIDI user group. Magazine on tape, plus programs and lots more. For more details contact Sean Sanderson on 05242 62258

MOTOROLA 68xxx MICROS – write to Rick Applegate, 68 Microgroup, 8 Great Cob, Springfield, Chelmsford, Essex. BBS tel 081-316 7402

MSX SYSTEMS – write to Keith Neal, MSX Link, Austerby House, 80 Austerby, Bourne, Linconshire PE10 9JL

NASCOM/80-BUS/CPM - Scorpio Systems, PO BOX 286, Aylesbury, Bucks HP22 6PU.Tel 0296 624868

NEWBRAIN - Ron Bury, NewBrain Support Grp, 70 Cranberry Lane, Darwen, Lancs BB3 2HL. Tel 0254 771891

NIMBUG – write to 13 Belle Vue Ave, Gosforth, Newcastle-upon-Tyne NE3 1AH. Tel 091-285 7806

NW ARCHIMEDES USER GROUP – Meets every Friday at Citizens Advice Bureau, next to Spectrum arena in Birchwood, Warrington. Ring Paul on 051-426 3915 after 6pm

OS/2 - Karen Burns, OS/2 User Group,Cecily Hill Castle, Cirencester, Glos LG7 2EF. Tel 0285 655888

OSBORNE/CPM/MSDOS – write to Jeremy Browne BOOG, 102a Aldershot Road, Fleet, Hants GU13 9NY. Tel 0252 621745 voice or 626233 BBS

PC/PD CLUB – write to 48 King William Drive, Cheltenham, Glos, GL53 7RP

PC SOFTWARE – PC Serve, 1147 Greenford Rd, Greenford, Middx UB6 ODP. Tel 081-864 2611, BBS 081-864 2633

PHILOSOPHY APPLE - G Haines, Chinese Room Club, 43 Cornwallis Gdns, Hastings, East Sussex TN34 1LX. Tel 0424 714 102

PICK OPERATING SYSTEM - Hugh Kellt, UK Pick Users Assocn, PO BOX 907, London N10 2SB. 081-462 4666

POTENTIAL PD – for the Atari ST. Public domain to sell and swap. SAE to Helenville, School Road, Coldingham, Berwickshire TD14 5NS.

PRESTEL - Andy Leeder, ClubSpot 810, Church Farm, Stratton St Michael, Norwich, Norfolk, NRQ15 2QB

PSION ORGANISER - Mike O'Regan, IPSO, 130 Stapleford Ln, Beeston, Nottingham NG9 6GB. Tel 0602 735482

RESEARCH MACHINES - Steve Rochford RM National User Group, George Stephenson High School, Southgate, Killingworth, Newcastle NE12 0SA. Tel 091-268 2002

REVELATION (PICK) — write to Malcolm Frame, UK Revelation User Group, 136 Saint Albans Road, Watford WD2 4AE or Telephone 0923 35515

R:BASE – write to Mrs Tansy Beal, R:Base User Group c/o Room A2044 BBC Woodlands, 80 Woods Lane, London W12 0TT. Telephone 081-576 7187

S&T PD for the ST. Large selection of PD from £1. Send £1 or a disk and 50p for a list. All prices include postage and packaging. Send cheque or PO to Simon Eve, S&T PD, 6 Crediton Road, London, NW10 3DU

SA40 User group – write to Roy Williams, 17 Grove Road, Acton, London W5 6AW.

SANYO MBC-550 - M H Syed, Wistaria, 53 Acacia Grove, New Malden, Surrey KT3 3BP. Tel 081-942 9009

SCHNEIDER EURO PC - Alex Kefford, SEPUG, 11 Crabbet Road, Three Bridges, Crawley, West Susex RH10 1NF

SCIENTIFIC PC USERS – write to Tim Bunning, SPCUG PO BOX 17, Retford, Notts DN22 6BQ Tel 0777 709009

SEGA SWAP CLUB – Exchange your old megadrive/master system carts –10 Sandwith Road, Todwick, Sheffield, S31 0JP

SERIOUS GAMER – Flat C, 43 Colvestone Crescent, London E8 2LG. Telephone 071 241 5446.

SERVICES USERS - write to Squadron Leader G Howson, Services Personal Computer Association, Stlk Eng 15a HQSTC RAF High Wycombe, Buckinghamshire

SHARP USERS CLUB – contact Andrew Ferguson, 11 Harcourt Close, Henley-on-Thames, Oxon RG9 1UZ. Tel 0491 574850 evenings only

SIRIUS – Simon Sheppard, ISSUE PO BOX 222, Brighton BN1 3BR

SHAREWARE KING – quality PC shareware. Over 3000 disks.Send SAE plus disks for catalogue to C Smith, 10 Penwood Close, Westbury, Wilts, BA13 3LW. Tel 0703 865263

SHREWSBURY AMIGA USER GROUP – informal meetings and lots more planned. Write with SAE to A Preece, 1 Haughmond Court, Featherbed Lane, Harlescott, Shrewsbury, SY1 4NJ.

SOFTWARE EXCHANGE – send an SAE for info to 13 Bourneville Lane, Birmingham, B30 2JY or phone 0860 444594 from12pm to 10pm

SOFTWARE EXCHANGE SERVICE – buy/sell/swap Amiga, ST and PC. SAE for info to 13 Bournville Lane, Birmingham B30 2JY or call 0860 444594.

SOLITUDE MOUNTAIN – Friendly new Amiga user group. Send blank disk or 50p to 565 Heathway, Dagenham, Essex

SORD M-23 – B Nicholson, Schlumberger Norge A/S Bjergstedveien, 4007 Stavanger, Norway. 474 657002

SMART SYSTEMS USERS – write to Francis Barton, Basement Holy Rosary church, Louis Street, Chapeltown, Leeds LS7 4BP. Tel 0532 629202

SOUTHERN AND DISTRICT. PC and ST user group.Tony Lowes 61A Broadway West, Leigh on Sea, Essex S59 2BX

SPECTRUM PLUS 3 USER GROUP – monthly magazine. 57 Lovers Walk, Dunstable, Bedfordshire, LU5 4BG

SPECTRUM DISCOVERY CLUB – magazine on disk for the Opus Discovery Disk Drive and the Sam Coupé. BD Mumford, 57 St Saviours Road, West Croydon, Surrey, CR0 2XE

STEN – the ST enthusiasts newsletter. Dave Mooney, 14 School Road, Morningside, Newmains, Lanarkshire. Tel 0698 382380.

STOS magazine, out every month.Send an SAE for full details to 11 Shore Crescent, Bishops, Waltham, Hants SO3 1DZ

STOURBRIDGE ATARI USERS' GROUP – for 8-bit Atari computers.Send SAE to LK Taylor, 99 Bredon Road, Stourbridge, West Midlands, DY8 4LA. Telephone 0384 379575

STUPID FLOWER PD – new library for ST users. Send an SAE for a free catalogue to SFPD, 3 Read Mead, Glastonbury, Somerset Ba6 8ON or call 0458 35027 and ask for Matt.

SUPERPROJECT - Geoff Groom, 3 Sunnymeade Ave, Carshalton Beeches, Surrey, SM5 4JA.. Tel 081-643 3336

SYNCROSOFT – Exclusive 64 computer information. Hardfacts, trouble shoots, pocket book. £2.95 to join, including p&p. Make cheques to Syncrosoft and send them to 9-10 Morland Gdns, Southall, Middx UB1 3DY

TAS (DATABASE) - Neil Hegarty, TASUG C/O Solutions for You, 1st Floor, 2 Lytton Rd, New Barnet, Hertsm EN5 5BY. Tel 081-441 1133, BBS 081-449 4171

TCS PD – over 250 disks to select from only 99p. Send SAE to 40 Upton Gardens, Tarring, West Worthing, Sussex.

TANDY/MS-DOS - Roger Storrs, NATGUG Oakfield Ldge, Ram Hill, Coalpit Heath, Bristol BS12 2TY. Telephone 0454 772 920

TEXAS T199/4a - Peter Brooks, International TI User Group 96 Banbury road, Oxford OX2 6JT. Telephone 0865 510822

THUNDERNEWS – CBM 64 user magazine on disk/tape. Send sae for details and competition to 159 Hough Road, Wallsall, West Midlands WS2 9BG

TIUGUK – TI99/4A user group UK for S/W on disk, tape and module. Offers magazine and help. Write with SAE for more details to Peter Walker, 24 Bacons Drive, Cuffley, Potters Bar, Herts EN6

TRANSPUTER - Howard Oakley, Transputer User Group, Brooklands Lodge, Park View Close, Wroxall, Ventnor, Isle of Wight

TYPECAST! – PD library for the ST/STE. DTP, WP, clip art and art programs. Paul Sealy, 31 Hartfield Crescent, West Wickham, Kent BR4 9DW.

UNIX USERS – UKUUG Secretariat Owles Hall, Buntingford, Herts, SG9 9PL. Tel 0763 73039 /73255 (fax)

VENTURA PUBLISHING - VPU (Ventura Publisher User group) Linda Liddell VPU c/o LLA Lound House, Forncett St Mary, Norfolk, NR16 1JP. Tel 0508 41580

WAKEFILED AND DISTRICT AMIGA USERS – interested in forming a local Amiga users' group? Contact Eddy on 0924 361101.

WORDPERFECT – Michael Norman, Wordperfect User Group (UK) Dove Barn, Manor Farm, Wootton Woodstock, Oxon, OX7 1DX. Tel 0993 812 670

WORDPERFECT – Dr Ian Barton, A Perfect World, High Rigg, Alma Rd, Tideswell, Derbys SK17 8LS. Tel 0298 871 925

• BBS

PUBLIC HOUSE BBS – on-line 24 hours a day. Bauds 300, 1200, 2400 and HST. Running on an Amiga using Paragon software. Among other features the board has large file areas including Amos PD, F100 Echomail and on-line games. Give us a call.

BATH BULLETIN BOARD needs help. Budding journalists, programmers, midi-musicians, techies etc to fill highly unpaid posts. For more details call 0225 836182. Bath BBS is the leading ST multiline Board on 0225 840060 (three lines).

PC-AMIGA LINK – 04023 84914. We have the friendliest team of sysops in Essex. Download from first call. Free IBM and Amiga technical and software support. Call 24 hours a day. Any mode up to 2400 Baud.

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SCOTHELP ST – 031 343 6368. The board is the UK support site for QuickBBS ST software and also provides a mail interface to the public for a (private) BBS at Atari UK for hot line support. We also supply a voice helpline on 031 332 9323 evenings

SPUDS XANADU – 0203 695266. The only known BBS to be run by a kitten supporting V21, V22, V23, V23b. Open 24 hours. The emphasis is on a relaxed atmosphere (no rules, no silly questions) and conversation into the surreal. Over 10Mb of software including *Bizarre Citadel* V3.3

STEVE AND JACKIE'S BBS – 0703 650037. V21, V22, V22b, V23. 24 hours. Messaging, files, entertainment, on-line games, shopping, second hand, adult sections. All free. User groups welcome.

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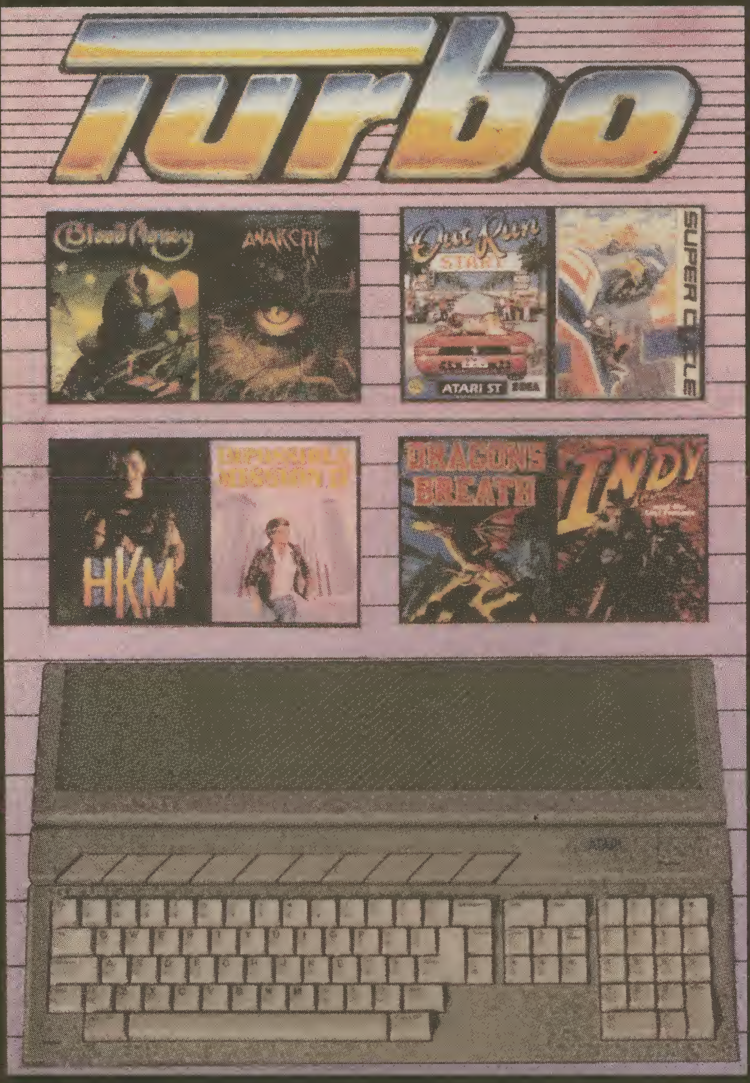
Hazzard Bb	071-737 0505	V21/22/22b/23
Health-data	081-986 4360	V23v
Heartbeat	0734 352032	
Hilary's Board	0277 233468	V21/23
Hot-air Opus	0579 70347	V21/22/22b
Humber Bridge	0482 850785	V21/22/23
Ichthus (trinity 3)	0734 461466	V21/22/22b/23
	0903 700771	V21/22/22b/23
Index Linked	0227 770403	V21/22/22b
Infocomm UK	0895 72021	V21/V22/V22
BIS.Intel Ace	0832 73003	V23v
Islington Bbs	071-704 0760	Hst
	071-226 1248	V21/22/22b/23
Jabulon Bb	0254 59352	V21/23/23v
Jersey Bbs	0534 37779	V21/22/22b/23
Jersey Opus	0534 39389	V21/22/22b/23
Jocks Awayl	031-225 5368	V21/22/22b/23
Jolly Fisherman	0754 67796	V21/22/22b/23
Jolly Roger	081-742 1640	V21/22/22b/23
Jusavo	0324 32414	V21/23
Just The Place	0705 258694	Hst
K-wood	0608 83458	Hst
Kashmir'S Bbs	0472 347882	V21/22/22b/23
Kernow Bb	0209 821670	V21/22/22b/23
Key-board	0908 668398	Hst
Keydata	081-676 0072	V23v
Kidlington Bbs	0865 56703	V21/22/22b
King Of The Castle	0233 620228	V21/22/23
Kirklees Opus	0484 665415	V21/22/22b/23
Kleopatra's Pyramid	0602 384281	V21/23/23v
Komputer Knldge	0844 274066	V21/22/22b/23
Kybernesis	081-673 7294	V21/22/22b/23
Labyrinth	051-724 4458	V21/23
Lamplight Qbbs	0705 811531	V21/22/22b/23
Laser Tbbs	0532 438430	V21/22/22b
Lau'S Ql Bb	081-751 6096	V23v
Lightfinger's Place	0202 485723	V21/22/22b/23
Linelight	0580 212043	V23v
Linx Bbs	0522 511277	V21/22/22b/23
Liquorice Allsorts	0633 279985	
Liverpool Mailbox	051-428 8924	V21/22/22b/23
Liverpool Ros	051-931 4271	V21/22/23
Loch lomond	0389 55762	V22/v22bis
Loft	0442 230461	V21/22/22b/23
Logical BBS	0772 623167	300-2400
Log On In Tynedale	0434 606639	V21/22/22b/23
London Bb	081-455 6607	V21/22/22b/23
London City Mag	081-468 7648	V21/23/23v
London Connexion	081-667 1313	V21/22/22b/23
London Embassy	081-366 1778	Hst
London Guest Hse	081-748 0974	Hst/v32
London Mail Centre	081-534 1200	V21/22/22b/23
London Metropolis	081-519 1055	V21/22/22b/23
Loony Bin	0703 787489	V21/23
Mabbs	021-444 8972	V21/22/22b/23
Mach II Bbs	0242 260 685	V21/22/22bis
Mactel Hq (grn Box)	0602 455444	V21/22/22b/23
Mactel Metro	081-543 8017	V21/22/22b/23
Mactel Phoenix	0473 610139	V21/22/22b/23
Madness Bbs	0603 300947	V21/22/22b/23
Magic Castle Bbs	021-430 3761	V21/22/22b/23
Magic Mushroom	0361 83641	V21/22/22b
Magnum	0274 547006	V21/22/22b/23
Magrathea	0376 24402	V23v
Manor	0980 863031	V21/22/22b/23
Marctel	081-346 7150	V21/23/23v
Matrix	051-255 0225	V21/22/22b/23
Mbbs Leconfield	0964 550745	V21/22/22b/23
Mbbs Mitcham lic	081-648 0018	V21/23
Medway	0634 280031	V21/22/22b
Mektronic Cnsltnts	061-773 7739	V21/22/22b/23
Mercianet	0203 611943	V23v
Merkinstead	061-434 7059	V21/22/22b/23
Merlin	0443 834179	V21/22/22b/23
Mgbbs	0443 733343	V21/23S
Micro Live Bb	081-567 6500	V21
Micro Update	081-877 1529	V21/22/22b/23
Microdeal	0726 65422	V21/22/22b/23
Microlog	0422 71921	V21/22/22b/23
Microview!	081-509 0729	V23v
Midget Gem	0748 834836	V21/23
Midnight Caller	0633 279243	V21/22/22b/23
Mind Boggles	0362 762868	V21/22/22b/23
Mininet 3	0642 672813	V21/22/22b/23
Miracom Support	0473 232540	Hst
Mirage	061-652 1242	V21/22/22b/23
Mirror Ii	0628 810889	V21/22/22b/23
Mirrorworld/quest 1	0883 844044	V23
Mission Impossible	0602 654329	Hst
Mk Board	0908 671289	V21/22/22b/23
Mkbbs	0908 504556	V22/22b
Monkey Tree	0952 677002	V21/22/23
Monusci	0293 545665	V21/22/22b/23
Motor Exchange	0484 435314	V21/22/22b
Multi-bbs	041-649 9043	V21/22/22b/23
Murdoch'S Hangout	021-711 2620	V22/22b
Murky Caverns	081-426 9386	Hst
Mwcfe	0926 421844	V22bis
My Little Phoney	0865 773277	V32/HST
Nicc Mid-west	0341 250377	V21/22/23
Nite Life	071-976 6807	V21/22/22b
No Escort Required	081-200 3817	Hst
No.1 Bbs	081-958 1689	V21/22/22b
Noah BBS	0272 572322	300-2400
Norpac	0434 608324	V21/22/22b
North Wales Bb	0978 88372	V21/22/22b
North Yorks Qbbs	0423 868065	V22/22b?
Northern Lights	0768 773685	V22/22b
Norwich Onion Bbs	0603 423305	V21/22/22b/23
Nova	0455 553371	V21/22/22b
Nova-net	0274 370760	V22
Odd-ball	081-679 2583	V21/22/22b/23
Open Access	081-427 3974	
Optix	0482 872294	V21/22/22b/23
Organic Garden	081-464 3305	V21/22/22b/23
Out Of The Blue	081-668 7667	V21/22/23
Owl Service	0532 605876	V21/23
P'S & Q'S Tel	051-236 3105	V21/22/22b/23
Pacific Lightning	0732 845338	V22/22b
Packet Bbs	081-547 1479	V21/22/2
Packet Place	0484 435620	V21/22/22b
Palm Beach	0303 265979	V21/22/22b/23
Paradise BBS	0635 248622.	300-2400.
Pazaz Viewdata	0383 620259	V23v
PC Access	071-608 0081	V21/22/22b/23
PC Forum	0322 335348	V21/22/22b/23
PC Serve Shop	081-864 2633	V21/22/22b/23
PC Serve Softnet	0895 420164	V21/22/22b/23
PC Serve Storehouse	0494 728094	V21/22/22b/23
Pc-vax Opus	081-800-3549	V21/22/22b/23
Pcamiga Bbs	0602 735119	V22/22b
Peacenet West	0895 448998	V23v
Pecan Software BBS	0272 248076	V21/22/22b
Penguin	0943 830820	V21/22/22b/23
Phantom	0226 340425	V21v/22v/23
Phoenix	0249 817704	Hst
Piston Popper	0424 853361	
Plug-ole	021-472 0256	V21/22/22b/23
Plus And Minus	0559 322766	V21/22/22b/23
Poacher	0476 62450	V21/22/22b/23
Polynet Bb	071-580 1690	V21/22/22b/23
Port Of Call	081-391 5779	V21/22/22b/23
Power Play Qbbs	0698 423669	V21/22/22b/23
Power Tower	υ533 880114	V21/22/22b/23
Prestonet	0772 612462	V23v
Project Bbs	0384 401770	V21/22/22b/23
Prometheus	081-300 7177	V23v
Proximity	0793 480028	V21/22/22b/23
Publishing Shop	091-261 5228	V21/22/22b/23
Purely Pc	0232 645942	V21/22/22b
Pyramid	071-239 0871	V21/22/22b
Pyroto Mountain	0895 59071	V21/22/22b
Really Interesting	0582 414991	
Reflex Bbs	0703 685527	V21/22/22b/23
Regency Bbs	0542 33050	V21/22/23
Remote!pcw	0555 851887	V21/22/22b/23
Rivendell	0602 640488	V21/22/22b/23
Rm Tech. Support	0865 796431	V21/22/22b/23
Road Runner	061-483 4105	V21/22/22b/23
Roamer I	0292 45345	Hst
Royalink Uk	0962 66807	V21/22/22b
SAC Bbs	0242 260685	V21/22/23/22b
Sas Bbs	0742 325232	V21/22/22b/23
Satellite Southwest	0392 53116	V21/22/22b/23
Scabs	0909 479080	V22bis
Scary Monster	0734 320297	Hst
Scot Air	0505 36036	V21/22/22b/23
Scothelp-st	031-343 6368	V21/22/22b/23
Scottish Opus	041-880 7863	V21/22/22b/23
Scottish Wildcat	0674 671141	V21/22/22b/23
Scs One	0444 236002	V22b
Sector	0772 454328	V23v
Semaj Qbbs	0303 862415	V22/22b
Sentinel Bb	0628 781429	V21/22/22b/23
Shades	0342 810905	V23
Shadowfax	0252 528146	V21/22/23
Shadowland	081-897 0488	V21/23
Shareware Library	0424 83654	V22/22b
Shasby'S Lair	0772 561066	Hst
Sherwood Forest	0602 397113	V21/22/22b/23
Short Circuit	0273 462967	Hst
Sid (acorn Service)	0223 243642	V23v
Signal Box	081-337 6583	V21/22/22b/23
Sin Bin	0532 661536	V23
Sirius	081-542 3772	V21/22/22b/23
Sirius Ii	0494 778425	V21/22/22b
Skull's Tower	081-943 1194	V21/22/22b/23
Sky-line	0603 742273	V21/23/23v
Skyline 1	0234 741691	Hst
Softmatic Bbs	0733 322540	V21/22/22
Software Source	0892 661149	V22/22b
Sorcerer's Dungeon	0636 815705	
Sounds Of Mercia	0203 682896	V21/22/22b
South Lincs BBS	0780 63954	
Sparx	0793 480287	V21/22/22b/23
Split Infinity	0342 712248	V23v
Pook Bbs	0268 767365	V21/22/22b/23
Sphere BBS	0294	221350
V21/22/23/22b		
Sputnik Spitfire	0501 31754	V21/22/22b
St London Bbs	081-443 2432	V21/23
Stabb	0793 855176	V21/22/23/22b
Staines Bb	0784 465794	V21/22/22b/23
Starbase One	071-733 3992	V21/22/22b/23
Strange Brew!	081-665 5038	V22/22b
Stun User Network	061-429 9803	V21/22/22b/23
Summer Wine	0484 653234	Hst
Sunburn Inc.	021-449 5269	V21/23
Super Ops Bbs	0782 284081	V21/22/22b
Swindon Newc Bb	0793 616683	V21/23
System-c-v	0403 50607	Hst
T.a.b.b.s.	0533 517615	V21/22/23
Tabbs	0225 743797	V21/22/22b/23
Taecomm	0994 6709	V21/23
Taff'S Retreat	0834 4562	V21/22/22b/23
Tardis	0772 27236	V21
Tasque	0355 222664	Hst
Tasug Opus	0904 760129	V21/22/22b/23
Tavern	081-445 6514	V21/22/22b/23
Tbbs-rovoreed	081-542 9767	V21/22/22b/23
Tequila Sunset	0703 867786	V23v
Terminal Net 5	0402 456135	V21/22/22b/23
Terminal-net	081-423 5262	V21/22/22b/23
Tharr Bbs	0234 261804	V22/22b
Third Wave	071-585 3163	V21/23
Three Kings	0354 56267	V21/22/22b
Track 83	0953 851351	V21/22/22b/23
Transylvania	0274 621668	
Tranz-com Bbs	081-952 6273	V21/23
Trinity I	0392 410210	V21/22/22b/23
Trinity Ii	0367 22764	V21/22/22b/23
Tug Ii	0905 775191	V21/22/22b/23
Twilight Zone	081-788 0884	V21/22/22b/23
Twilight Zone Ii	071-608 1485	Hst
Uk Healthlink	0942 722984	V21/22/22b/23
Unisys Etoi Bbs	081-453 5739	V21/22/22b/23
Unit One	0285 713688	V21/22/22b
V.i.t.a.s.	021-749 5860	V21/23
Valente'S Bbs	071-978 2078	Hst
Vector System	0329 45824	Hst
Viking East Anglia BBS	0255 503048	V23v
Village	081-464 2516	V21/22/22b/23
Village Fayre	081-841 5971	V23
Voyager Bbs	061-725 9580	V21/22/22b/23
West Norfolk	0553 761290	1200/2400
White Lightning	0635 37259	V22/22b
Whitehall Pent	071-930 3903	V21/22/22b/23
Wild Imaginings	091-263 4303	V21/22/22b/23
Winchester Remote	0962 69322	V21/22/22b/23
Wolver'ton Ros	0902 745337	V21/22/22b/23
Womble Base	081-979 9606	V23
Woodgreen Bbs	081-889 5624	V21/23
Yugo Bbs	0734 753648	V21/22/22b/23
Zeus Bbs	0487 710487	V21/22

ATARI ST

"E" & "FM"



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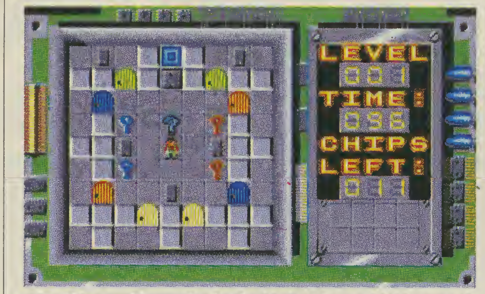


• **Mr Chips** *could consoles be the birth of future 16-bit games?*

GAMES WEEK

Neil Jackson gives you the low-down on the latest new games, playing tips, cheats and news.

This week Games Week sent its data-gathering spy deep into US Gold territory, to see what future releases are in store. After penetrating the high-security, classified-information-retrieval-system (aka a small filing cabinet in Woody's office), our man returned, laden with sneak previews of the firm's forthcoming attractions.

In the coin-op conversion department, USG is looking forward to the day it releases *Shadow Dancer*, a martial arts beat-'em-up which features a ninja and his small dog! Apparently, US Gold claims it has recreated the arcades eye-catching features on the home computers – this includes the innovative attack patterns and the complex Ninjitsu art of fighting. We'll have to wait until March to find out how true this is.

At the same time, US Gold is hoping to release the sequel to *Gauntlet 2*, excitingly named *Gauntlet 3, the Final Quest*. What do you reckon? This one could run as long as Rocky! Details are sketchy, but you can expect similar gameplay to its predecessors. Look out for a review in Games Week when it makes it to the shops.

Sometime in February, we should see the release of *Warlock, The Avenger*, the innovative sequel to *Druid and Enlightenment*. In fact, you get the original game, *Druid*, free when you buy *Warlock*. Eight trap-strewn dungeons await you, full of secret passages and evil enemies to deal with. Your task is to find the evil Acamantor and destroy him, before, you've guessed it, he destroys you.

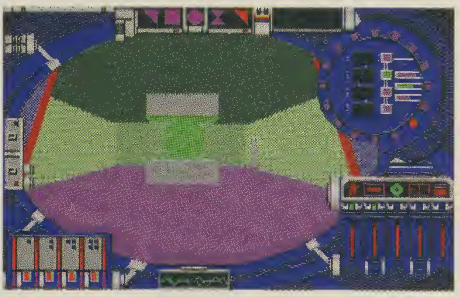
In a curious development, US Gold has snapped up the rights to release *Chip's Challenge*, an intriguing puzzle-strategy game first seen on the Atari Lynx of all things. Hundreds of incredibly twisted puzzles should give you hours of fun – the original console game was unputdownable and its big brother is likely to be the same. You are Chip, a young kid with a crush on the brainiest girl in the school. Before she'll be your friend, you must prove your mental agility by successfully dealing with ice, water, fire, thieves and all manner of Gauntlet-style weirdness. Look out for *Chip's Challenge* any time now.

Another good-looking title lurking in USG's dungeon is *Cybercon 3*, an original game, designed by Richard Pinto, co-designer of Carrier Command. The game is centred around a huge peace-keeping computer which controls the world's armoury (humans can't be trusted, you see). Sadly, Cybercon has gone a bit bonkers and is now re-evaluating its opinion of mankind. Transformed from defender to destroyer, it's become a dangerous genocidal maniac. And guess who gets to stop it. Nah! Couldn't be! It is! (As if you didn't know). Featuring what's claimed to be the fastest, smoothest-scrolling 3D effects ever, *Cybercon 3* is an action adventure, with over 350 individually designed rooms, full of puzzles. This is one GAMES WEEK will be giving the full treatment to, just as soon as we can send a man "on the inside" again. It'll probably be sometime in March, so keep your eyes peeled. Til then, it's on with the rest of the show....

TOP 10 SIXTEEN-BIT GAMES

THIS WEEK	LAST WEEK	CHART WEEK	TITLE	PUBLISHER	MACHINE
1	2	6	*Powermonger*	Electronic Arts	ST AG
2	4	39	*Treasure Island Dizzy*	Codemasters	ST AG
3	RE	30	*Kick Off 2*	Anco	ST AG PC
4	1	5	*Fantasy World Dizzy*	Codemasters	ST AG
5	5	7	*Robocop 2*	Ocean	ST AG
6	3	7	*Teenage Mutant Hero Turtles*	Mirrorsoft	ST AG PC
7	6	3	*FastFood*	Codemasters	ST AG
8	RE	25	*F-19 Stealth Fighter*	MicroProse	ST AG PC
9	8	10	*Lotus Turbo Challenge*	Gremlin Graphics	ST AG
10	RE	4	*World Class Leaderboard* (KL)	Klassix	ST AG PC

For the week ending 12th January 1991
ST – Atari ST Ag – Commodore Amiga PC – IBM PC or compatible
Chart compiled by Gallup. © European Leisure Software Publishers Association.



• *Techno space age adventures await you in* **Cybercon 3.**

DAMOCLES

NOVAGEN

Save the World – nuke a comet!

DION
A TO Z COMPUTER
BIRMINGHAM ISLAND
01-49-29

Save the planet Eris from destruction! You can now stop the comet Damocles from ploughing its way through the innocent planet with this little solution.

At Eris Capital spaceport, enter the building and pick up the key to the VIP limo. Jump into it and drive to the State Office, where you'll find the Damocles file. Read this and get the lift to the President's office. Haggle for your bounty – she'll go up to 20 million ECUs but no further. She'll also tell you where to find the key for a spaceship. Get it and drive to the Moorby School of Flying. Jump in and fly to Eris Capital 15.03, buying a pressure when you get there.

Fly to Key West 07.07 and get the antigrav from the basement. Then go over to Hansen's Laboratory at Bare Island 06.05. You'll find Key B in the basement – the key for his hiding place. Upstairs are various documents to be read. Then head off to 06.06 to buy the thermal undies for use on hot planets

Snow Island Sorting Office is next, at 03.00. Read all you find here and check out the cupboard. It's really detonator 2. Get it and go to Eris Capital 11.08. Pick up your spaceship and enter the building, where you'll find a transporter.

Walk in and out of the transporter until you get to Metis. Pick up the transporter and go to 05.06. Inside is a table, behind which is a concealed door. Walk towards it to make it open and inside you'll find detonator 4, disguised as a wash-basin. Get this, drop your transporter and walk into it. Come out at Hantzen's new house on Ur City, Gaea 07.01. Check out the sideboard, because this is detonator Number One.

Leave Hantzen's house by the front door (you picked up the key earlier, remember) and go to Ur City 09.02. In the basement is a piano and a rather large Novabomb – forget the piano, it's useless, but the Novabomb? Well..

The last detonator is offered for sale in the window of a shop at Chaldea Metropolis 05.06. It looks cunningly like a Hi-Fi system, but it isn't, so buy it. You now have everything you need to finish the game. Except, perhaps, time.

Jump in your spacecraft and fly immediately to Damocles. Land on the comet itself and drop the Novabomb on the surface. Fly off again, to a safe distance and switch on all the detonators. Damocles becomes Ground Zero, and the ensuing fireworks are second to none. And that's it – game over! But there are still four more ways to solve the Damocles problem, without destroying the valuable Comet...

TEAM SUZUKI

GREMLIN • AMIGA and ST • £24.99

Easy rider or two-wheeled nightmare?

Racing games, for so long staid and predictable, are being reappraised, revitalised and released. The best new twist to the old plot is the addition (or rather, subtraction) of two wheels. Motorbikes, once greasy, unattractive noisemakers are now sparkling, streamlined noisemakers, and the racing motorbike scene rivals Formula One in the glamour, glitz'n'titz department.

Mindscape hit the streets a short while ago, with its *Ultimate Ride*, and now Gremlin is hard on its heels. Long since overtaken and lapped are Activision's *Super Hangon* and *Enduro Racer*. Whereas the latter two were both arcade licences, *Team Suzuki* is an entirely different animal. True, it seems that commercial endorsement still carries weight (or it would have been called Team Gremlin or Team Wheelie or something similar), but beyond the name, there is little evidence of Suzuki involvement. *Team Suzuki* is an original game that has been given extra credibility by a big name, rather than a conversion of a popular arcade.

With a style similar to that of *Ultimate Ride, Team Suzuki* uses fast 3D vector graphics to provide its display. Chunky motorcyles, grandstands, and Armco barriers lend themselves reasonably well to digitising, and at the same time create a "virtual reality" feeling, where you can move anywhere to see any view.

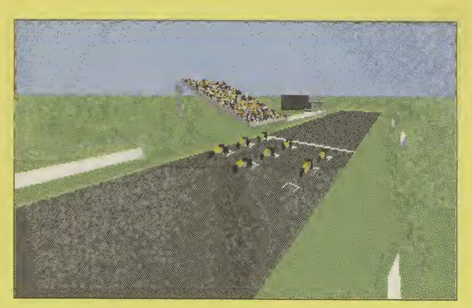
Unlike *Ultimate Ride*, all *Team Suzuki*'s action takes place on circuits rather than roads. There are 16 tracks in total, ranging from the easy-looking Laguna Seca, to the tortuous Nurburgring, but including all the major 500cc Grand Prix tracks on the way.

Each race starts with a qualifying round, where you struggle to control the bike around a few laps at lightning speed. This decides your position on the final staring grid. Most likely, you'll spend the first few moments dealing with the incredible response of the bike, as it hurtles around the track, banking over from knee-ripping bend to elbow-scraping corner. Mouse control is advised, due to the immediacy of the response, but a joystick can be used if you're prepared to wait a short while while commands are decoded. This can be a bit hairy on tight bends, so stick with the mouse if you can handle it.

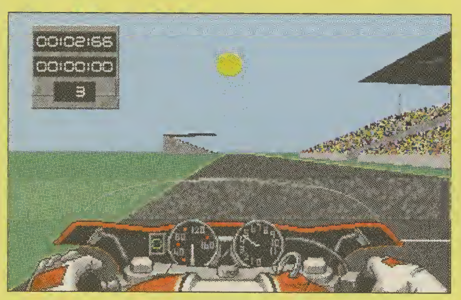
After successful qualifying, the race proper begins. Traffic lights give you the go-ahead, as you'd expect, but beware of tail-ending the guys in front. There are eight bikes on the circuit in each race and despite their size, they can be tough to get round. Some loiter in the centre of the road, making you risk wall-bashing or grasstracking to get by. Others pull into one side in a feigned "I'm sorry I'm in your way!" fashion, only to veer into your path at the last moment. Distinctly unsportsmanlike, and often requiring a change of trousers afterwards!

Suzuki's only downside is its unfair treatment of opponents. You are penalised heavily for contact – your bike slows down, drops a gear or worse, stalls completely – whereas the other geezer gets off scot free and pulls well ahead of you.

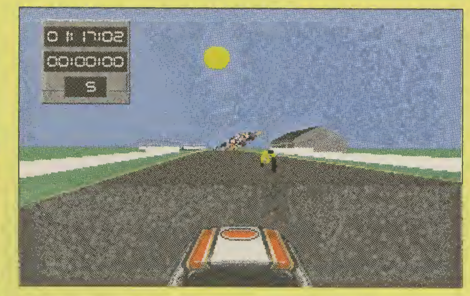
However, that apart, *Suzuki* is an all-action game, which definitely gets the blood pumping nicely. Come and 'ave a go if ya think you're 'ard enuff! Bet you won't make it round the first lap without falling off!



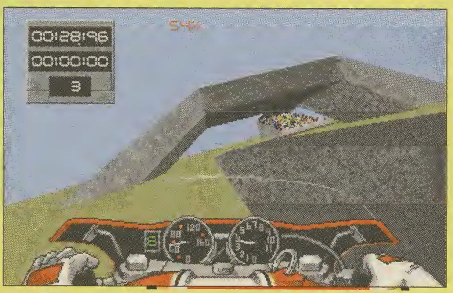
• Seven other competitors stand between you and victory.



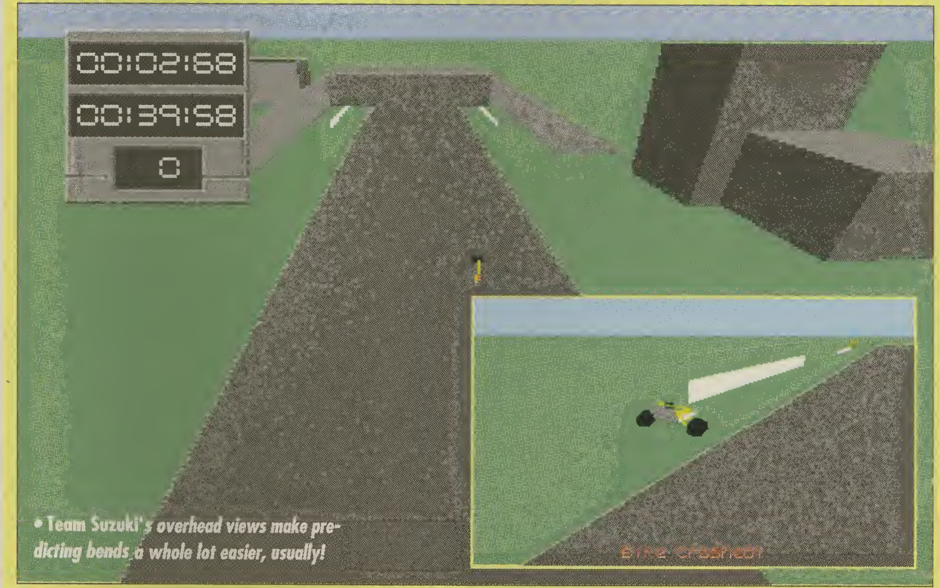
• Seconds to your getaway and pole position seems lonely.



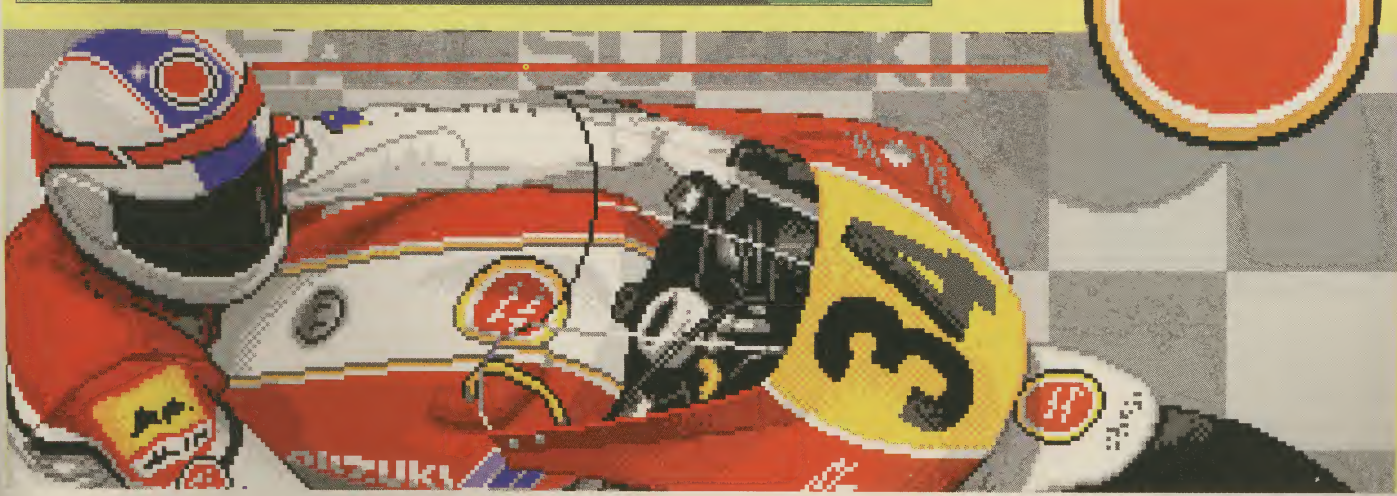
• Over your shoulder you see the rest of the pack catching up.



• Team Suzuki really lets you throw your bike into the bends.



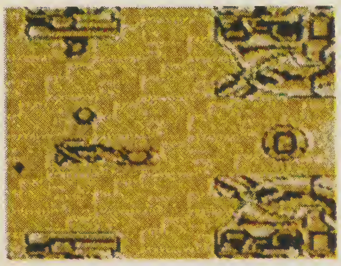
• Team Suzuki's overhead views make predicting bends a whole lot easier, usually!



CONSOLE ZONE

The infamous Narc and R-Type are now set to become bestsellers in their console versions. Richard Frederick has his finger on the trigger.

NINTENDO GAME BOY



• **RType:** *destroy the Bydo Empire in this sure-fire soon-to-be classic.*

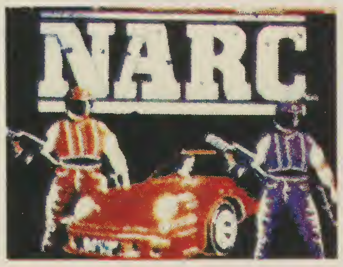
Irem, the classy Japanese coin-op company, has released its classic *R-Type* shoot-'em-up on the mono marvel machine.

The evil Bydo Empire is causing problems in the dark regions of outer space so it's up to you, piloting the sophisticated R-9 fighter, to save the universe from total destruction.

R-Type is packed with everything a diehard space blaster wants: collectible weapon pods, multiple stages and glorious end-of-level guardians. You even get 'The Force', the cutest pick-up ever found in a horizontally scrolling shooter. Attach it to the front or rear of your fighter or let it off the leash to do its own thang.

This game is destined to become a 'must-buy' for Game Boy owners and includes a two-player option for double trouble. *R-Type* costs ¥3600 (£15).

NINTENDO ES



• **Narc:** *have you got the guts to play it?*

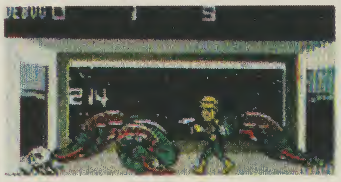
"No one had the guts... until now," says Acclaim, a leading light in the world of Nintendo games, in its advert for *Narc*.

This conversion of the top-rated Williams coin-op includes a host of memorable characters including Kinky Pinky, Joe Rockhead and the infamous Mr Big. You assume the role of Max Force battling through nine levels of play as you take on Mr Big and try to 'bust' his criminal empire. Seize all contraband, stolen money, illegal weapons and remember, Just Say No to drugs!

Narc is the first NES game to feature a second player 'buy-in' mode, as found in the original arcade game. You can protect the innocent and punish the guilty for only $44.95 (£23).

The two major *Narc* characters, Max Force and Mr Big, now 'star' in a syndicated animation and live action TV series in the States called *Video Power*.

ATARI LYNX



• **Xenophobe:** *alien blaster fodder.*

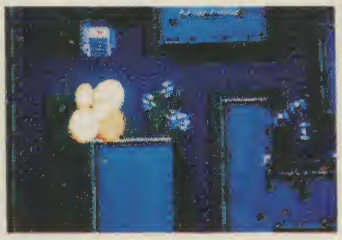
Do you harbour a strong dislike for aliens? *Xenophobe* is a side-scrolling coin-op conversion that has up to four players trapped inside a space station crawling with the sort of nasty skin-sucking creepy crawlies which populate the average Hollywood B-movie.

You assume the role of one of several characters – including heroes, an alien and a duck-like creature – in an attempt to clear each alien-infested base. On the way you must search for extra weapons and other valuable objects.

The aim is to make it back to the command ship alive, though John Hurt managed the same thing in the movie *Alien* and gained a hefty stomach ache as his reward.

Xenophobe costs £29.99, and remember, in space no-one can hear you scream!

SEGA MEGADRIVE



• **Granada:** *tank battles in the 21st Century.*

The Super Strategic Defence Initiative of the late 1990s banned inter-continental ballistic missiles and nuclear warheads. Now the year is 2016. Weapons today are limited to super strategic mobile weapons. Enter *Granada, Hypertek-Cannon Tank (HCT).*

Californian company Renovation Products, a subsidiary of Telenet Japan, has released the latest scrolling Megadrive shoot-'em-up. You command the Granada hypertank through the 'peaceful' streets of Tobora before battling the giant flying Astarsha battleship and then another HCT known as Valsic.

Your hyper cyber tank is armed with an awesome array of weaponry including multi-directional interceptors, long-range homing missiles, and a device designed to totally obliterate all opposing forces.

"If you enjoy fast paced action-packed thrills, you'll love the feel and sound of *Granada*," says Renovation Products. ■

PLAYING TIPS

NINTENDO ENTERTAINMENT SYSTEM

To continue *Double Dragon II* missions seven to nine press [A], [A], [B], [B], [Down], [Up], [Right] and [Left] on controller two.

SEGA MASTER SYSTEM

For a wider *Quartet* shot press [Pause] 14 times on the title screen before you start the game.

NEC PC ENGINE

For some *Military Madness* sounds enter the password: ONKAGU

ATARI LYNX

Thanks to Graig Thornton in Lincoln for this *California Games (Halfpipe)* hint: Continually perform aerial turns; the amount you score on each turn depends on when you let go of the [A] button. Graig has managed a respectable score of 17,847 using this tactic. Can you do any better?

By the way, Oliver Atkinson from Northampton has achieved a high score of 14,125 on the same event. Well done dudes, keep running some radical scores (as they say on the West Coast)!

GAME BOY

Thanks to Nicholas Wells in Norfolk for this *Golf* gift: If you make an awful shot, quickly reset the game (press [Start], [Select], [A] and [B]) before the ball stops then continue. You now restart before you made the previous shot, so you will have another chance. Keep doing this until you get a perfect shot!

SEGA MEGADRIVE

For a *Thunderforce* option screen press down [Start] and [A] on the title screen.

Do you have any handy hints for the Megadrive versions of *Castle of Illusions* starring Mickey Mouse, *Columns*, *Moonwalker*, *Strider* or *Super Monaco GP*? Send them to the Console Zone at the usual *Express* address.

THE TRADING ZONE

Are you confused by the huge range of video games out there? Have you ever been stung by a real turkey? Don't worry! Just sit back and let the Zone lead you through the greatest games available on your console. This week we see the Sega Master stunners:

1) *Impossible Mission*
Straight down the line conversion of the Epyx C64 cult classic. You're a secret agent out to save the world in a platform adventure with elements of puzzle arcade game. Stay a while, stay forever.

2) *Gauntlet*
Search 100 different levels of dark dungeons while battling ghosts, demons and sorcerers. You have the choice of playing an elf, wizard, warrior or valkyrie. Includes simultaneous two-player option.

3) *R-Type*
Battle the evil Bydo Empire in your trusty R-9 fighter through eight levels of expertly crafted shoot-'em-up spacescapes. Don't forget to go for the reflective lasers. May The Force be with you.

4) *California Games*
Entertaining sports simulation devotees of the American West Coast. Play six wacky events – half-pipe, roller skating, BMX riding, footbag, frisbee-throwing and the Californian favourite, surfing. Like tubular city, man!

5) *Wonderboy III*
What's happening? The hero of this platform arcade game is wearing a nappy. Obviously this is Sega's answer to Nintendo's phenomenal *Super Mario Bros* games.

Alex Kidd in Shinobi World is also worth a look.

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INTERCEPTOR
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The Commodore A500 Batman Pack must surely rank as one of the most popular computer packs ever! The pack features the **Commodore Amiga 500 computer** with **mouse controller** and **TV modulator**, plus four top software titles. The software includes: **'Batman The Movie'** - Rid Gotham City of the cunning joker, in Ocean's top selling title based on the blockbuster Batman film; **New Zealand Story** - high quality conversion of the leading arcade game; **Interceptor** - Dogfight with two F-16's in this leading flight simulator; **Deluxe Paint II** - top quality Amiga graphics package which set the standard for others to follow. Return the coupon for further details.

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ESCAPE / ROBOT MONSTERS:

Here's something completely different - a science fiction story with comic book style graphics. Our heroes Jake and Duke are on the Planet X rescuing Humans who have been captured by the Robot Monsters and forced to create an evil Robot Army to DESTROY EARTH! Jake and Duke fight their way through hordes of evil Robots to help the Humans escape.

RAINBOW ISLANDS:

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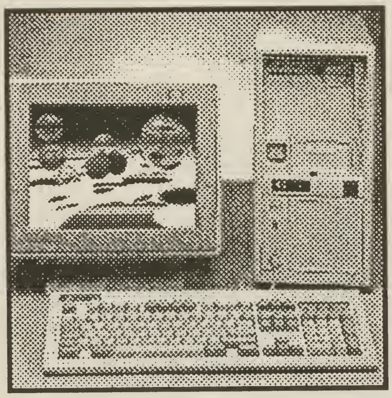

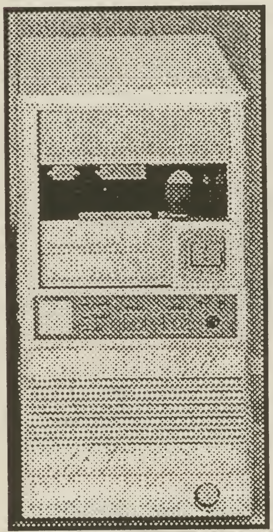

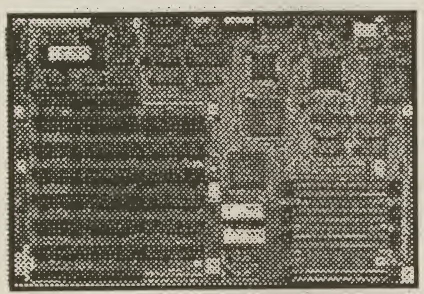

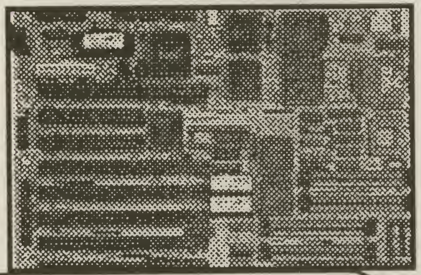

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AMIGA VIDEO

MAKING THE MOST

Making videos isn't just a matter of pressing the right buttons – you've got to have the right kind of add-ons to get your images. Damien Noonan shows you just what you need.

So, you want to be a video producer? Well, the key piece of technological trickery here is a gadget known as a genlock. The genlock is a small add-on to your Amiga which allows you to superimpose computer images onto a video picture.

It works by synchronising and locking together the line and frame generators of each display's refresh rate, hence the name 'genlock'. This is achieved by combining the three separate RGB (red, green and blue) signals from the Amiga into a 'composite video' or PAL signal (the kind your TV uses) which is in turn combined with the composite video output from a videodeck.

There are two basic techniques that this allows you to use. 'Foreground keying' is a superimposition of the video signal on a specific colour you've made transparent in your computer image – usually blue. Alternatively, 'background keying' or 'masking' allows the video image to be placed behind the computer image where the chosen 'transparent' colour is the only one visible. So displaying titles over a video image, like the subtitling in foreign films, is foreground keying while any applications where the computer screen borders are active – in wipes and fades – background keying is used.

But remember, just because you have a video mix on screen doesn't mean you can save moving video images to disk. The resulting mixed image is still only suitable to be recorded as a video signal, to video tape.

WHAT CAN YOU DO WITH IT?

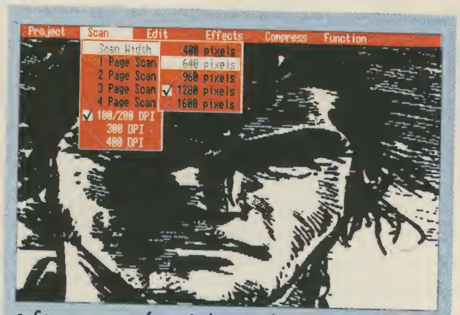
So what ends can you put all this to? Firstly you may wish to record some of your Amiga graphics to videotape instead of disk. It might be a lengthy animation sequence you've designed which you may wish to superimpose over a recorded video sequence.

But it's probably in the area of overlays that a genlock can be most effectively used. Simple operations such as adding titles to a videotape are achieved by opening up a window on your Amiga desktop and setting its background to the 'transparent' colour your genlock is using, booting up an Art or DTP package and overlaying the text. ITV's *The Chart Show* uses an Amiga to display information over music videos by making the Workbench background transparent. Alternatively you can use a dedicated paint or video package like *DPaint III, DVideo III, Deluxe Productions* or *Video Studio* to produce a range of animated, scrolling credits or 4096-colour logos. This is probably the easiest way of producing superimposed material.

In this way you could annotate photographic albums you've previously digitised as well as add titles to home video productions. It might be something as useful, yet profitable, as producing a looping window display for your company that shows your product line along with details of special features and products.

At the end of the day your Amiga video hardware and software exists as an enhancing tool to the secure and installed medium of video. What next? Demos for broadcast TV? Offers of promos for your local bands? The only limit that of your own imagination. ■

Damien Noonan is editor of Amiga Format *magazine. These articles are reprinted from his book,* Get the most out of your Amiga, *available from Future Publishing Ltd, The Old Barn, Somerton TA11 7BR. Price: £9.95.*



• Scanners are of particular use for black-and-white or 'line' artwork for use in DTP work. Colour is expensive.

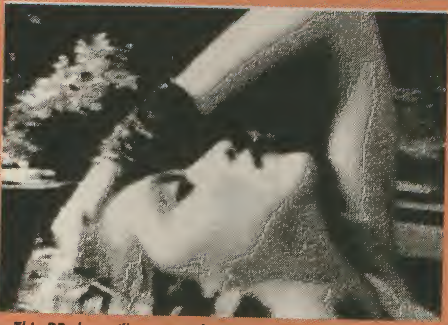
SCANNERS

There is an alternative to a digitiser if you want to grab pictures from something flat, like a photograph. The scanner does not grab a whole image at one go like a video camera – instead, as the name implies, it scans across the image reading it in a line at a time. Scanners can give very high quality pictures which are particularly useful for DTP.

Scanners come in two types. The more expensive kind of scanner is the flatbed. This is rather like a photocopier – you lay the image on top and close the lid and it does the job automatically. The cheaper option is the hand-held version which you must position over the image yourself.

Popular models in the flatbed range are the Sharp scanners (talk to a specialist dealer) while the hand-held market is changing swiftly: Until recently it was dominated by the Datel Genscan 4000 (Datel £169.99), but that is now available in a new version and will face strong competition from new Naksha and Golden Image products. Keep your eyes peeled for full reviews of these three.

WHICH DIGITISERS IS BEST?



• This PD demo illustrates the power of the digitised image.

There's only one way to get photo-realistic graphics and that's to use the Amiga version of a camera – a video digitiser. In seconds a device called a video digitiser can snapshot an image from the outside world and convert it into something that can be displayed on the Amiga's screen. The images produced with a video digitiser or image grabber are known simply as digitised pictures. There's nothing special about these pictures, if you exclude the fact that they look so realistic: they're no different from other Amiga screen formats.

There's nothing mysterious about the way images are grabbed: a video camera or video recorder does the seeing and sends pictures to the digitising hardware. The hardware converts the incoming signals into something recognisable by the Amiga: that is, numbers. Ultimately these numbers appear as pixels on the screen. Depending on the sophistication of the hardware in use, digitised images may appear in monochrome, grey scales or colour. And the time to generate these images varies from several minutes to tenths of a second.

RECOMMENDED

FRAMEGRABBER • £575 • Marcam 071-258 3454
This is expensive because it grabs full-colour images in real time. Incoming signals are stored in a buffer and when you ask it to grab, the unit takes only 1/50th of a second to do its stuff. Before display, the software optimises the palette and enhances the image and both the intensity and saturation of the input signal can be altered using knobs on the front of the box. Images can be produced in any Amiga screen mode, including Overscan and EHB, in anything from two to 4096 colours.

DIGI-VIEW GOLD • £149.95 • HB Marketing 0753 686000
Has a heck of a reputation. Colour images are captured using a colour separation process, where three snaps of the same image must be taken, one through each of the supplied red, green and blue filters. Meanwhile, the subject must be stationary. Gold includes new Dynamic Hi-Res and Dynamic HAM modes, the latter of which is able to display all 4096 colours on screen at the same time – an incredible feat. Digi-View also now includes a free copy of the original *Digi-Paint,* which makes it extremely good value.

VIDI AMIGA • £99.95 • Rombo Productions • 0506 414631
Undoubtedly the best value digitiser on the market and works in real time, so a variety of video sources including camera and recorder can be used. All available memory is used. A sequence of frames can be grabbed automatically and then animated.

VIDI CHROME • £19.95 • Rombo Productions • 0506 414631
A colour update to the original mono version. This, too, is very good value. In colour, Vidi works on the three-pass RGB system, so it is no longer a real-time process.

ST MAKES PAGES

Desktop publishing takes word processing to its logical conclusion and gives you full control over page layout, typography and graphics. Mark Higham shows you how to make the most of it.

Where word processing tends to comprise one typeface, in one size and in one format, desktop publishing (DTP) gives you the chance to print out pages in a variety of formats and made up of a host of boxes, columns and graphics. Where word processing is used to create straightforward pages of text, DTP is used to produce attractive-looking newsletters, magazines, books and newspapers.

A desktop publishing package is concerned with the look of the final page rather than the content of the writing. To this extent most DTP packages only provide rudimentary text editing facilities, majoring instead on typography, the incorporation of clip art, simple box and line drawing and page layout.

Almost all DTP packages demand that you lay down marked boxes, or frames, which can be filled with text or pictures. The frames and their entire contents can then be moved or resized easily. There are often facilities to overlay frames and to crop and scale graphics. When frames are laid over other frames most DTPs will automatically re-flow the text within the outer box to fit around the new one.

The sizes and styles of text which most DTP packages can produce allow a wide variety of effects and support a number of different types of document. You can usually adjust the size of each font, the space between lines of text (leading), the width of each column in a multi-column page (measure) and the space between characters (kerning).

As well as being able to import graphics from a variety of sources, including art packages and digital picture scanners, most DTP packages offer basic facilities for drawing lines, boxes, circles and ellipses so that you can design boxouts and flashes to highlight portions of your document. Many packages also offer a number of tints and fill patterns to vary the design and give weight to areas of the page.

The logical reason for using DTP is to output printed pages. Since all DTP packages print pages out as graphic dumps, the quality of the page depends on the printer you're using. The basic rule is to go for the best quality printer you can afford. A 24-pin dot matrix is a good deal better than 9-pin, while a laser printer is best of all (but also the most expensive by a long way).

In DTP, the resolution of your printer is all important. This is simply defined as the number of dots per inch (dpi). This figure directly affects the apparent quality of the image. At low resolutions diagonal lines and curves appear ragged and the viewer is very aware that all images are composed of dots. As the resolution increases so lines get smoother and the eye glosses over the space between the dots and begins to see the image rather than its components. When you reach the resolution of newspaper photographs (about 120 dpi, but with a varying dot size) most people are prepared to accept them as 'true' photographs.

The resolution of monitors is normally well under 100 dpi, with colour monitors displaying lower resolution than monochrome ones. The ST colour monitor (SC1224) has a resolution of 40 dpi, while the monochrome SM124 provides 80 dpi.

Printer resolution starts at about 150 dpi for 9-pin printers, rises to over 200 for 24-pin printers (actually as much as 350 dpi in multi-strike modes) up to 300 dpi, the standard for laser printers. Above this are high-res laser printers at 600 dpi, and photo- typesetters like the Linotron 100 and 300 series which are used to produce quality magazines and books at between 1200 and 2400 dpi. These machines cost around £50,000 but you don't need to mortgage your house to get this kind of quality output. You can print a page onto disk and then send the disk to a special printing bureau which will print it for you for a fee. Signa offers such a service for files created using Calamus. ■

Mark Higham is editor of ST Format *magazine. These articles are reprinted from his book,* Get the most out of your ST, *available from Future Publishing Ltd, The Old Barn, Somerton TA11 7BR. Price £9.95.*

BEST DESKTOP PUBLISHING BUY

TIMEWORKS DTP • £99 • Electric • Timeworks

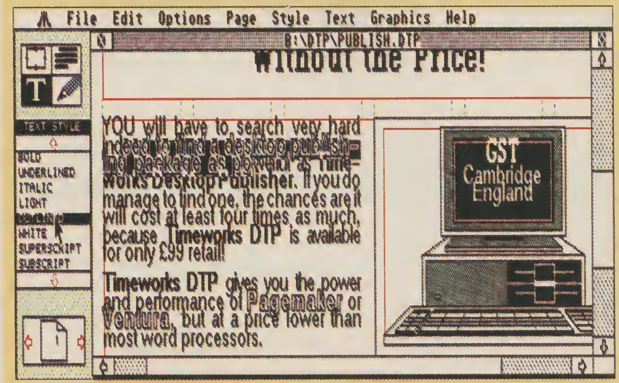
Timeworks desktop publisher often gets overlooked because it's one of the first DTP programs ever to be released on the ST yet it's still one of the most popular. Newer DTP packages have added extra frills, but as a result they've always weighed in with a hefty price tag. Timeworks is very competitively priced and has all the features you need to produce a quality fanzine or newsletter.

Timeworks makes use of a 'browser' to select paragraph styles, text and graphics files or text effects like bold or italics. A paragraph style is a collection of typographic settings (eg font, point size and justification) given an individual name and available to be assigned to any block or blocks of text on the page.

The four work modes are Frame, Paragraph, Text and Graphics, the last offering extensive shape drawing and filling. Frames can be made to snap to column grids, which themselves may be defined from a separate window. This feature alone can be a real time-saver in multi-page documents, but you can also turn snap off to obtain precise control over frame positioning. Frames can be repositioned at any time and text is automatically reflowed around an overlaying frame.

The in-built text editor is fast and includes cut and paste and a search and replace function. Screen update of text is reasonably quick, and noticeably faster in medium resolution than in high. Text files from First Word Plus and Word Writer can be transferred directly, but files from other word processors can also be imported as ASCII text.

Timeworks supports a number of graphics formats, including Degas and Neochrome, and the conversion is done the first time a graphics file is loaded. The image is initially scaled to fit the frame into which it's loaded, but cropping any part of it automatically rescales the selected area to fit the frame. All images are treated at current screen resolution, but this does mean you can edit them directly and a magnifying pixel editor is included.



Without the Price!

YOU will have to search very hard indeed to find a desktop publishing package as powerful as Timeworks Desktop Publisher. If you do manage to find one, the chances are it will cost at least four times as much, because Timeworks DTP is available for only £99 retail!

Timeworks DTP gives you the power and performance of Pagemaker or Ventura, but at a price lower than most word processors.

• **Timeworks** *– one of the first DTP programs on the ST and still popular.*

Once text is in position on the page, you can quickly set up its typography using paragraph styles, but you can also use the browser to set common effects such as bold and italics. The entire system is very easy to use once you've developed the self-discipline to define your paragraph styles before composing your document. What isn't so attractive is *Timeworks*' insistence on putting a blank line between paragraphs.

When you put together a paragraph style you are given the option of adjusting the leading. Under conventional page layout, specifying a leading the same size as the font would give a minimum useful gap between lines, allowed for in the design of the font. In *Timeworks* this pre-defined gap is much too large and leading values smaller than the font size are ignored. This means that multi-line headlines (and sometimes body text) nearly always look too widely spaced. Another problem is the spacing of words on the screen. If your text is justified, the word gaps appear enormous in actual size display, and its true spacing only becomes apparent when you enlarge the view to double size or print the page. This detracts from the main advantage of a WYSIWYG DTP.

The fact that the vast majority of ST-originated fanzines are created within *Timeworks* DTP is testament to its versatility and usefulness. It doesn't incorporate frills like rotated text found in its rival Calamus, but then it doesn't come with a £400 price tag. In all, a superb package at an ideal price.

THE ATARI ABC

Now, there's a PC-AT compatible that not only solves problems like other AT compatibles, it also solves the one problem that its predecessors have created ... affordability.

Silica Systems are pleased to present the new Atari ABC. The ABC is a 286 AT compatible that runs at over 5 times the performance of the IBM XT. This is achieved by combining the power and speed of a 16-bit 286 processor, with Atari Corp's development experience and engineering capabilities, which use the very latest in design technology. However, the Atari ABC's are available at 'XT prices' and many XT owners will wonder why they paid more, but got less!

The ABC is a reliable, high performance computer, built to exceptionally rigorous standards. It is well designed, to a state of the art specification, maintaining maximum expansion capability for the future. This includes up to 4Mb of RAM and 3 AT expansion slots. Plus, unusually for a PC at this price, the ABC has the ability to install two or three extra drives, with the cabling already inside the CPU.

The ABC has a host of impressive features, all built-in as standard, encouraging simple installation and ease of use. In addition, the ABC's small footprint and quiet operating, mean that you will notice it less on your desk than other PC's. Except, of course, when you begin to take advantage of its AT power.

At its remarkably low price point, the ABC is ideally suited for home, office and educational use and will take full advantage of the vast range of PC compatible software. And, with 12 months FREE on-site maintenance (8 hour response), you can rest assured that your ABC will be fully supported.

The ABC is the latest addition to a comprehensive range of both 286 (8Mhz or 12Mhz) and 386 (16Mhz and 20Mhz) PC's, from the Business Systems Division of Atari Corp. Atari's PC range offers an unsurpassed combination of reliability, compatibility and expandability, with unique features like Atari's 44Mb removable hard disk on their PC4. Return the coupon NOW for further details of the complete range of PC products from Atari's Business Systems Division.

ABC TURBO
AVAILABLE: JUNE 90

To put the ABC even further ahead of the competition, we have introduced a special 'Turbo' version, which includes a super fast RLL hard disk controller to increase the data transfer rate from 150KBytes/s to 800KBytes/s, with a performance index of 4.801. Plus! to provide exceptional graphics with an outstanding colour resolution of up to 1024×768, we have included a Super VGA graphics adaptor and a 14″ VGA colour monitor (which also supports 1024×768 resolution), all for an additional price of only £300. Check the ABC Turbo against the competition, at only £1299 (+VAT) with 30Mb hard disk, Super VGA colour graphics capabilities, plus 12 months on-site maintenance, it offers unbeatable value.

LOW PRICE - HIGH SPEC!

CPU+MOTHERBOARD
- 8Mhz 80286 16-bit CPU
- Landmark Speed = 10.3Mhz, Norton SI Test = 9.0
- Latest NEAT (New Enhanced AT) technology chip set
- Has user selectable bus, DMA speeds & wait states
- Programmable to operate at 0 or 1 wait states
- 640K RAM base memory (expandable)
- Motherboard expandable to 4Mb RAM memory
- Real time clock with battery back-up
- Full 16-bit data line capability
- Socket for 80287-8 numeric Co-Processor
- 3 16-bit AT expansion slots (max)

DISK
- 32Mb RLL hard disk - 150KBytes/s transfer - 60ms access
- Fast disk controller - 800KBytes/s transfer - *Turbo version*
- 1.44Mb built-in 3½″ floppy disk drive
- Space for two 5¼″ and two 3½″ drives (max)

I/O
- Parallel port built-in (25-pin Centronics)
- Serial port built-in (9-pin RS-232)
- Mouse controller port built-in (9-pin serial)

GRAPHICS
- Super VGA video graphics controller - *512K - Turbo vers*
- Super VGA: 256 colours in 800×600 res - *Turbo vers*
- EGA video graphics controller built-in
- EGA: 16 colours available from a palette of 64
- EGA: 256K of dedicated Video RAM built-in
- MDA, CGA and Hercules graphics controller built-in

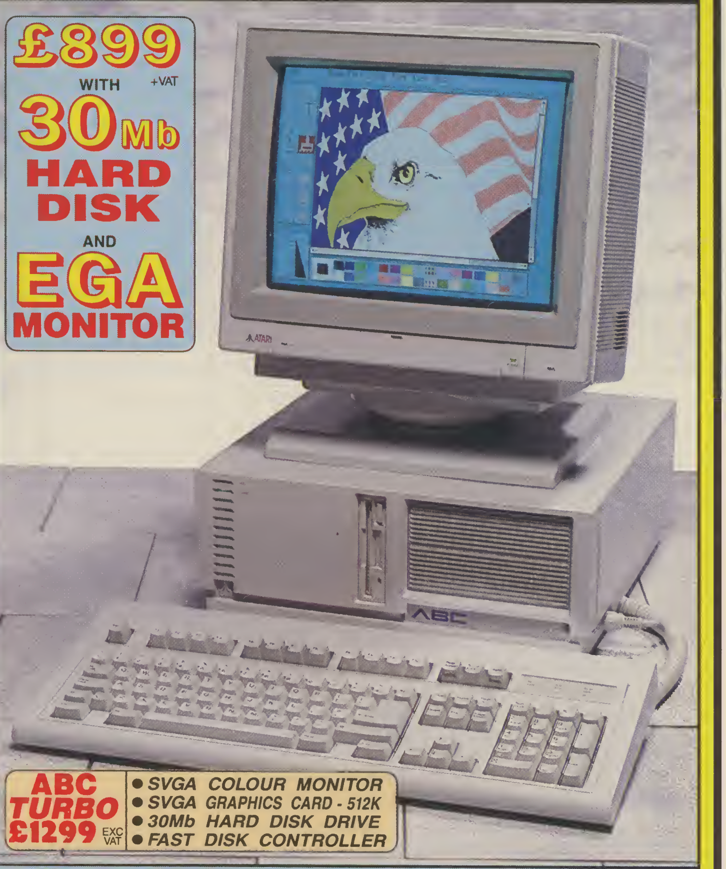
PHYSICAL
- Low noise operation
- Ergonomic small footprint (38cm×41cm×15cm)
- Keyboard - 102 key enhanced AT (12 function keys)
- Keyboard - has 2 position height adjusters

PLUS!
- Fully OS/2 compatible (requires 4Mb RAM)
- Supports Industry Standard Networks
- MS-DOS 3.3 with GW BASIC 3.22
- 12 Months FREE on-site maintenance included

286 AT

WITH 30Mb HARD DISK & EGA MONITOR - £899

FREE! - ON-SITE MAINTENANCE
FREE! - TECHNICAL SUPPORT HOTLINE
FREE! - TEST/BURN-IN BEFORE DESPATCH
FREE! - OVERNIGHT COURIER DELIVERY



£899 +VAT
WITH
30Mb HARD DISK
AND
EGA MONITOR

ABC TURBO £1299 EXC VAT
- *SVGA COLOUR MONITOR*
- *SVGA GRAPHICS CARD - 512K*
- *30Mb HARD DISK DRIVE*
- *FAST DISK CONTROLLER*

£899

+VAT= £1033.85

ATARI

	3½″ FLOPPY DRIVE NO HARD DRIVE	3½″ FLOPPY DRIVE + 30Mb HARD DRIVE
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ABC TURBO AVAIL: JUNE 90 • *14″ SVGA COLOUR MONITOR* • *SVGA GRAPHICS ADAPTOR* • *FAST DISK CONTROLLER*	**£1099** +VAT = £1263.85	**£1299** +VAT = £1493.85

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ON-SITE MAINTENANCE (8 hour response): Available Free of Charge on all ABC's.
TECHNICAL SUPPORT HELPLINE: Team of Atari technical experts at your service.
100% QUALITY CONTROL: Every ABC is tested/burnt-in before despatch.
FREE OVERNIGHT COURIER DELIVERY: On all hardware orders shipped in the UK.
ESTABLISHED 12 YEARS: Proven track record in professional computer sales.
£13M TURNOVER (with 60 staff): Solid and reliable with maintained growth.
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PRICE MATCH: We normally match competitors on a "Same product - Same price" basis.
SHOWROOMS: Demonstration and training facilities at our London & Sidcup branches.
THE FULL STOCK RANGE: All of your Atari PC requirements from one supplier.
FREE CATALOGUES: Will be mailed to you with offers and software/peripheral details.
PAYMENT: Cash / cheque / credit card / credit - we are licensed credit brokers - details on request.

Before you decide when to buy your new Atari ABC, we suggest you think very carefully about WHERE you buy it. Consider what it will be like a few months after buying your ABC, when you may require additional peripherals or software, or help and advice with your new purchase. And, will the company you buy from contact you with details of new ABC products? At Silica Systems, we ensure that you will have nothing to worry about. Silica Systems is a new division of Silica Shop, the UK's leading Atari specialists. This new division has been established to provide a service to the more serious home user, as well as to business and education purchasers. Silica have been established for over 12 years, and have an annual turnover of £13 million. With our unrivalled experience and expertise, we can now claim to meet our customers requirements with an understanding which is second to none. But don't just take our word for it. Complete and return the coupon now, for our latest Free literature and begin to experience the "Silica Systems Service".

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PLEASE SEND INFORMATION ON ATARI PC's

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Company Name: ....

Which computer(s), if any, do you own? ....

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MEDIA VISION FO

As different technologies begin to converge, the need for a universal standard of data storage is ever more pressing. Tecnation's Alex Blok sets out his vision of the storage of the future.

No one can have overlooked the fact that there is about to be a revolution in the storage of information, whether it be in the fields of audio, video, text, publishing, computer data, still photography or medical and scientific research.

With the advent of the micro electronics revolution and more recently, data compression technology, more and more of this information is being stored in digital form.

To date, for each application there has been a different media type for the storage of information based on assortments of chemical, analogue or digital technologies, introducing a huge range of storage media types on to a frustrated world.

Consider the poor consumers with their old 8mm movies, compact audio cassettes, 35mm negatives, vinyl records, VHS video cassettes, Compact Discs – and that is before he buys his DAT deck, a still video camera and a personal computer.

At present the only world standard for the communication of information is paper. With a sheet of paper one can mix written ideas, drawings, musical compositions, etc, without any 'compatibility' problems, other than that of language.

While there is no doubt that paper will always remain, the development of DynaBook type 'stylus' operated computers will offer an intelligent digital alternative.

What is needed is a world recognised standard for the physical storage of ALL digital information, whether it be the shape of the media or the method used to address the actual data. Not a European standard, a Japanese standard and a US standard, but just one standard that should arrive midway through the 1990s ready for world wide use in the final run up to 2000AD.

Tecnation is proposing UDiS, or Univeral Digital Information Storage Data, as a proposed solution. Tecnation realised there could not be just one media type due to the different storage capacity and application requirements of the market. With UDiS, the freedom and versatility of paper would return in the form of the UDiS DataCard, the UDiS DataBook and the UDiS DataStik. Each 100 per cent solid state.

THE UDIS DATACARD

The mid-range design both in terms of memory size and physical dimensions is the UDiS DataCard. This is of credit card shape and will replace most of the removeable media currently in use.

As technology progresses, the DataCard will be able to take on more ambitious roles such as replacements for hard disks and eventually as moving video recording media. Meanwhile it will supersede floppy disks, computer games cartridges, musical instrument voice cards, smart cards and telephone cards.

But what about the card's memory? As this proposal goes to press, flash memory technology is being introduced. Whilst this is a convenient alternative to the floppy drive in portable computers, it has some disadvantages that may make it impractical for us in the UDiS DataCard. Firstly, it will be quite some time before Flash will offer substantial storage capacities at a reasonable cost making its use in personal multimedia unlikely. Secondly, it is not possible to erase data from a Flash circuit at byte-level. This will make efficient file management difficult. Of course, if a major advance is made which fixes these problems Flash would be ideal. Its non-volatility would eliminate the need for a battery, making it easier to produce a totally sealed case – essential as the DataCard will no doubt see action in hazardous environments.

Otherwise, gallium arsenide is another possibility. This is a very expensive technology currently at the development stage. The benefit of gallium arsenide is its speed, and that is about all. It is expensive and draws no less power than current silicon memory. In years to come it might be viable to use it in a range of special high speed DataCards, only time will tell.

Our research shows that eventually holographic memory will be the ideal answer. It offers ultra high speed access as well as huge capacities. It will eventually be possible to fit a holostore memory module in a credit card sized case, such as the UDiS DataCard.

Battery-backed silicon memory may be the best option if the DataCard is to be introduced in the mid 1990s. If the battery can be charged from the solar cell then our ideal of a sealed case could be realised.

Software applications

- Easily upgradeable computer operating systems
- Business programs
- Computer games
- Clip-art libraries

Professional multimedia

- Digital video
- Digital audio
- 3D animation keyframes and object databases

Domestic multimedia

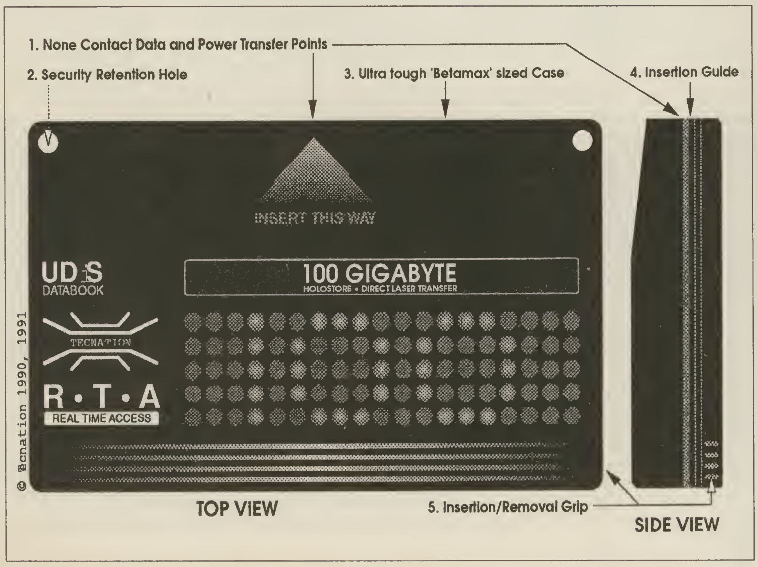
- Still video cameras
- Personal stereos

Personal

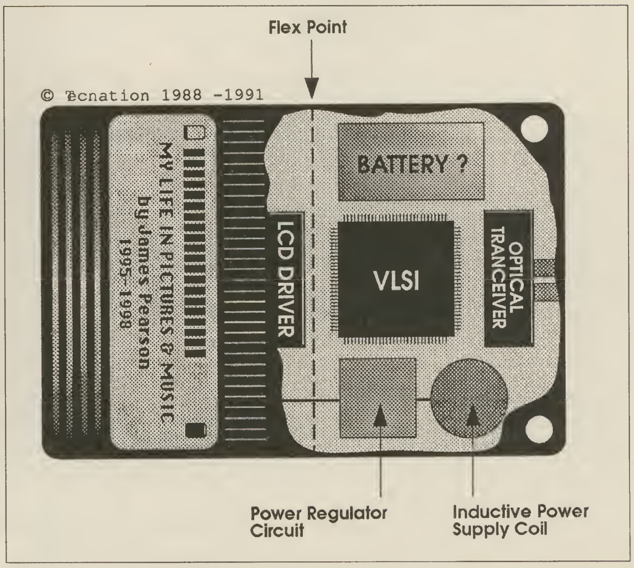
(These could all be combined onto one 'permanently on person' DataCard).

Digital passport.

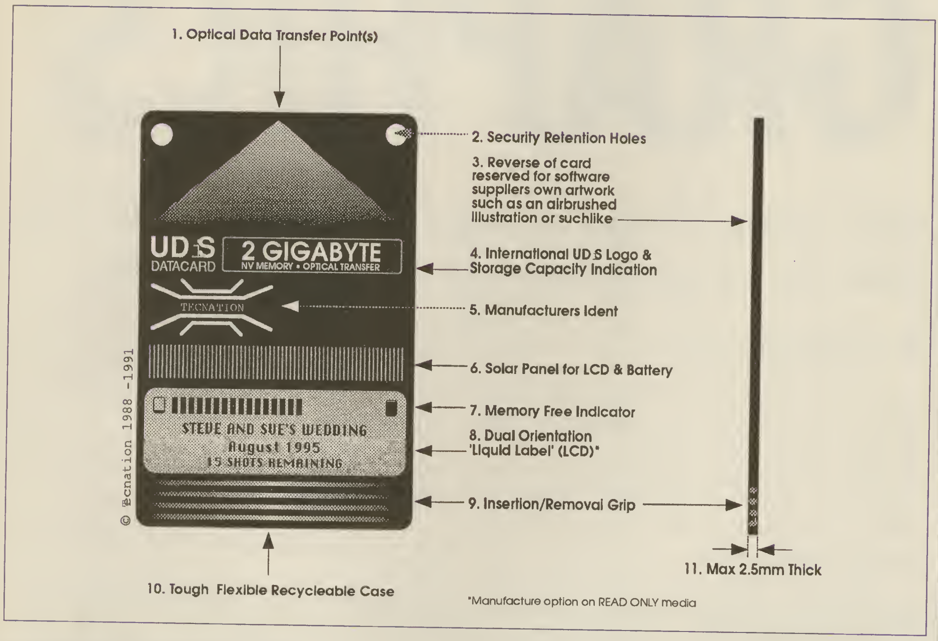
- Security key.
- Smart personal bankers or credit card.
- Personal organiser data.
- Electronic instrument samples and voices.
- Lighting controller program cards.
- Medical records (including compressed graphics of scans, etc).
- Video letters for low cost cross continent communications.



1. None Contact Data and Power Transfer Points
2. Security Retention Hole
3. Ultra tough 'Betamax' sized Case
4. Insertion Guide
INSERT THIS WAY
UDiS
DATABOOK
100 GIGABYTE
HOLOSTORE • DIRECT LASER TRANSFER
TECNATION
R•T•A
REAL TIME ACCESS
© Tecnation 1990, 1991
TOP VIEW
5. Insertion/Removal Grip
SIDE VIEW



OR THE FUTURE


1. Optical Data Transfer Point(s)
2. Security Retention Holes
3. Reverse of card reserved for software suppliers own artwork such as an airbrushed illustration or suchlike
UDiS DATACARD
2 GIGABYTE
NV MEMORY • OPTICAL TRANSFER
4. International UDiS Logo & Storage Capacity Indication
TECNATION
5. Manufacturers Ident
6. Solar Panel for LCD & Battery
7. Memory Free Indicator
STEVE AND SUE'S WEDDING
August 1995
15 SHOTS REMAINING
8. Dual Orientation 'Liquid Label' (LCD)*
9. Insertion/Removal Grip
© Tecnation 1988 -1991
10. Tough Flexible Recyclable Case
11. Max 2.5mm Thick

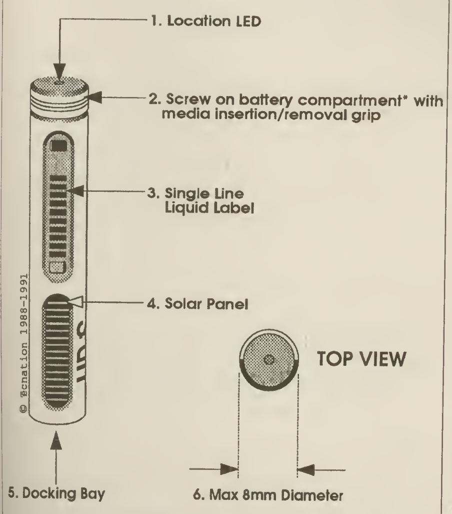
*Manufacture option on READ ONLY media

- Personal data storage and transfer.
- Yet to be invented electronic devices.

THE UDIS DATABOOK

The most important in the UDiS media range, the DataBook will be the size of a small book and will replace current mass storage media from tape drives to magnetic and optical hard disks as well as all the different types of home and professional video cassettes. It will feature:

- Small book size: (156mm wide x 95mm deep x 24.5mm high).
- Real time access to stored HDTV video.
- Ultra high speed serial UNIFII optical interface.
- Laser diode array optical coupler.
- Inductive power transfer.
- Built in dot matrix LCD 'liquid label'.
- Built in solar cell for the LCD and any built in rechargeable power cells.
- Ultra tough car wheel, drop and water resistant casing.


1. Location LED
2. Screw on battery compartment* with media insertion/removal grip
3. Single Line Liquid Label
4. Solar Panel
UDiS
© Tecnation 1988-1991
TOP VIEW
5. Docking Bay
6. Max 8mm Diameter

*Depending on memory technology used, may not always contain battery

Fig ?? - The UD/S DataStik

HOLOGRAPHIC MEMORY

With the two most important features of the DataBook being high read write speed and a massive capacity, holographic memory technology is the most likely contender.

Tecnation is currently developing this proposal in conjunction with the Texas-based Microelectronics and Computer Technology Corp (MCC) which is developing new techniques for storing digital information as 3D optical holograms. Holostores, as they are known, are composed of light-sensitive crystal rods which store data as 2-D patterns of light. MCC claims this optical technology is capable of moving in one second an amount of data it would take a magnetic medium such as a hard disk five hours to transfer!

With realistic investment, advances could be brought forward to make holographic memory viable as a low cost mass storage medium before the turn of the century. Unless something else is invented, we see this as being the ideal answer once problems of volatility are ironed out.

Software Applications

- Easily upgradeable mini computer operating systems.
- Company databases.
- Archiving.

Professional MultiMedia

- High definition digital video.
- Digital audio.
- 3D animation keyframes and object databases.
- Ray Traced 3D animations

Domestic Multimedia

- Solid state digital VCRs

UDIS FEATURES

The key features forming the basis for the UDiS Media standard in all its three forms:

- 100 per cent solid state
- Multi datatype filing system
- Data compression/decompression firmware built into interface
- Asynchronous interface
- None contact data & power transfer
- Remote data access
- Built in liquid crystal display label ('liquid label')
- Tough, simple construction
- Easy media storage
- Environmentally safe
- Pleasant, safe aesthetics

- 'Instant' digital audio systems

Education and Entertainment

- Massive virtual reality databases (both graphical and video based)
- Multimedia learning

Personal

- 'My Life In Pictures' digital interactive diaries.
- Electronic instrument samples and voices.
- Medical records (including compressed graphics of scans etc).
- Video letters for low cost cross continent communications.
- Yet to be invented electronic devices.

THE UDIS DATASTIK

The most specialised in the UDiS media range, the DataStik will be smaller than the cap of a biro. Designed for applications where compact storage is required, the DataStik will replace micro audio cassettes in dictating machines, but will mainly see use in medical instruments and other data logging applications.

- Pen cap size.
- In built Smart circuit.
- Inductive data and power transfer.
- Built in solar powered single line liquid label.

Unlike the DataCard and DataBook, the DataStik is unlikely to be used in applications where superior capacity and access speed are necessary. Hence it will feature a less sophisticated design which will keep costs down and ensure reliability in its very specialist applications.

- Business.
- Digital Dictating Machines.
- Medical.
- 'On Persion' Data Logging.
- Multimedia.
- Pen sized video camcorders.
- Entertainment of future.
- Personal stereos. ■

This article forms part of a 60-page proposal available from Tecnation, Shoe Lane, 18b New Inn Hall Street, Oxford, OX1 2DW for £115.

GRABBING GRAPHICS

Fancy a change of image? Or even a little colour in your life? Dave Golder tries to get an amazing number of colours from his Amiga.

A video camera is pointing at you, and you can see your image crisp and clear on the monitor next to it. You wave, and your image instantly waves back at you. Nothing unusual about that. Except that the camera is not connected directly to the monitor. The picture you are looking at is actually the pixelated output from an Amiga.

The reason the Amiga can produce such a high quality image is that it has been fitted with the VD2001 real-time digitiser graphics card. It can now transform any incoming video signals into 24-bit colour resolution, using up to 16.7 million colours on screen simultaneously in resolutions of 512 x 600. So what you see on the monitor is a computer-generated real-time which is being continuously processed in the Amiga.

At £1,750 this Austrian-designed package is more than just a very expensive way of getting your mug on a television screen. Aimed primarily at studios using professional video equipment, such as Umatic, the VD2001 package is based on a new graphics card called the Masterboard VB1. The card can only be bought as a video output version, the FB2001 for £1,350, for use purely as a frame buffer for displaying 24-bit graphics.

But the VD2001 has a high quality frame grab and display facility with accompanying software you can use to create a variety of video effects. Feed a video image into the card and with one click on the 'Stop' command you have a computer generated image which can be manipulated either with the genlocking-type facilities included on the card itself or with any other paintbox package (*Sculpt, DPaint,* etc).

The UK distributor for the VD2001, G2 (phone 0252 737151), hopes that alongside other 24-bit colour packages for the Amiga, such as the *Art Department* picture manipulator from ASDG and the upcoming *Megapaint* paintbox software, the card will help take the Amiga into new areas. Indeed a number of professional editing and animation studios are showing interest and G2 claims that Real 3D and Imagine are already writing drivers for the card.

It can be installed on any Amiga from the A2000 upwards. The software can run on as little as 2Mb, but a minimum of 5Mb is recommended so that buffer copies of grabs can be stored in the Amiga's RAM. Even then, with the files averaging around 900K each there's not room to store that many, and, unfortunately, most Amiga floppy disks are too small to store even one grab. The grabs are stored in the standard Amiga IFF (interchangeable file format) files.

The electronic grab output from the card is displayed on one screen while a separate monitor is used to show the menus you use to manipulate the image and other data concerning disk file information. The main menu contains the commands for starting the digitising – 'Run' – and grabbing the image – 'Freeze' – as well as the functions dealing with the genlocking effects of which the card is capable.

Through the 'Digitise' menu the contrast, brightness and red, green and blue balances of the electronic image can be preset before the image is frozen. This can't be done after the image has been grabbed, which is rather limiting since a moving image can be very different to view from a frozen one. The manipulating facilities for the frozen image are similar to those offered by the kind of genlocking devices for which G2 is most well known. Genlocking is where a video image and electronic output from a computer are combined. Usually this takes the form of 'drawing' computer created lines, shapes or letters onto a separate video image, the most common examples being captions.

With the VD2001, the areas painted in by the computer are called masks. When the 'mask' menu is called you have a wide variety of options open to you. There are eight different sizes of pen with which you can draw using the mouse as a guide, though it takes a very long time to become even slightly competent at doing this accurately. Apparently upgrades of the software will feature commands that will automatically draw straight lines, squares and rectangles as well as a paintpot which will fill in enclosed areas, and the sooner they are installed the better.

Another way a mask can be overlayed on the picture is by clicking on the 'key' function and using the cursor to chose a certain colour on the image. All areas of the chosen colour then become a mask which can be changed to whatever other colour you wish. So, for instance, you can click on someone's hair and turn it into a stunning shade of blue.

Once the image has been frozen you are restricted to overlaying a fairly limited choice of colour: red, green, blue, cyan, yellow, magenta, black, white and transparent (called 'key'). Granted the software makes no pretension of being a paintbox program and it would be unfair to judge it on that level, but with 24-bit colour capabilities it would be useful to have a bit more choice of colour, or even to be able to change the shades of the existing computer-created colours.

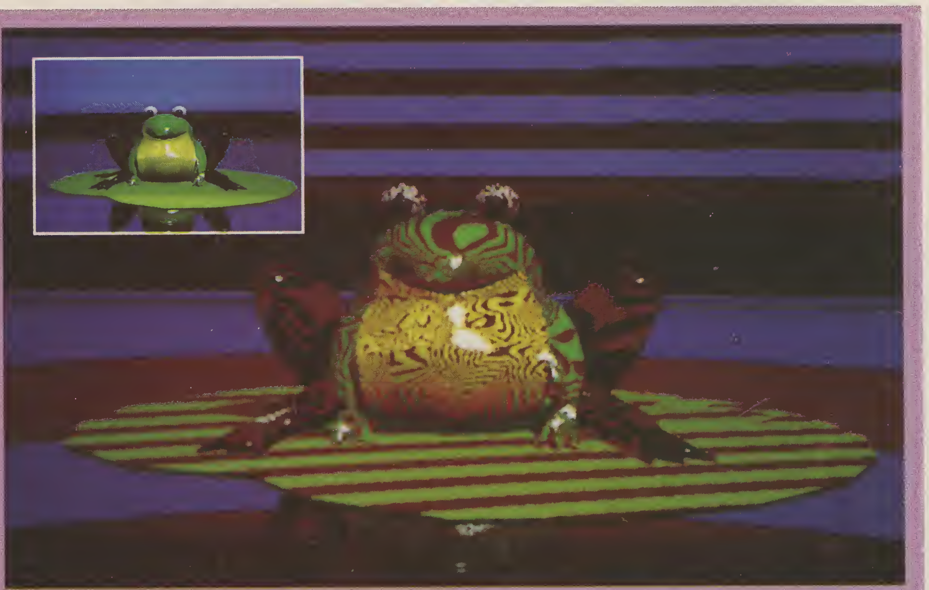
With transparent mode, masking an area and making it 'key' can produce an effect like being in a Dee-Lite video. It can also create multi layer effects by continually saving a picture with masked areas of key, then feeding in a new image behind it.

The 'Brush' menu, which oddly has little to do with painting, is the command with which you mark out an area on screen which can be cut out, copied, reduced or enlarged. The cut out area, known as a brush, can also be stored in a temporary memory buffer to be recalled when needed. A brush can be placed back on screen wherever and as many times as you want, so you can almost become an instant David Hockney.

A useful feature of the menus is that they contain some common features so you don't have to keep going back to the main menu; these include 'freeze', 'mask' and 'colours'. Right at the bottom of each menu is a line which reads 'DIS/BRU/MSK/CAN' which will take you directly to the digitiser, brush, mask and main menu respectively. This labour-saving touch is one which many other programs could do with using.

The version we tested still had a lot of functions not installed and a few that had hiccups, but G2 promises that most of these problems will be eliminated in a quick succession of upgrades to be installed free of charge.

Whatever the limitations of the post-grabbing capabilities of the card, though, there is no denying that it carries out its primary function – grabbing crisp, clear, professional quality 24-bit colour images on an Amiga – exceptionally well and at a reasonable cost. ■



• This picture was created on a 24-bit colour art program and then displayed by the VD2001. It shows the enormous variety of the colours and shades the card can handle. The inset shows the same picture after applying some of the genlocking facilities of the card. Lots of wonderful effects can be created, even if the number of colours you can overlay is fairly limited.

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That was in the days when even Haydn Fitz-Williams was a lad though, and nowadays in the dashing digital 1990s, things have changed a bit.

Enter NextBase with a whizzy suite of route planning software called *Autoroute*. Simply, *Autoroute* is a program that is available for the PC and ST that allows you to type in where you are and where you'd like to be, add where you'd like to stop for lunch and in a few seconds tells you how to get there.

For example, when someone in the office wanted a quick way to slip off to Blackpool hallucinations for a weekend singularly lacking in moral fibre, he tapped in Bath and Blackpool and as an afterthought planned a meal stop in Halesowen.

We aren't allowed to tell you who it was because Colin would never forgive us, so you'll just have to guess which news editor called Campbell it was. Anyway, back to the newshound in his Porsche *(shouldn't that read Reliant Robin? – Ed)*

Autoroute thought about it for a few seconds and had him trotting off up the A4, A46, M4, M5, M6, M55, A583 and roaring on to the Golden Mile with just a short detour from junction 3 on the M5 down the A456 to Halesowen for a quick scoff. *Autoroute* also allowed him to work out optimum times for his journey and was within five minutes of his true arrival time. Once in Blackpool a typical seaside landlady scotched any plans he'd had of enjoying the weekend, but that's the fault of his moral quotient and no reflection on the splendid software that got him there.

Proof positive that *Autoroute* will get you where you need to be but if you insist on staying in seaside boarding houses, you get what you deserve.

Anyway, the show must go on and so must the competition. No competition would be complete without questions and here they are. If you want to stand a cat in a box's chance of success, you'll have to get the whole lot right .

1) What is the speed limit for coaches on motorways in the UK? (I know that they roar past at over 90 but they're not supposed to, are they!)

a) 90mph
b) 60mph
c) 70mph
d) 110kph

2) Which was the first section of motorway opened in the UK?

a) The M1 between Hendon and St Albans
b) The M6 between Broughton and Bamber Bridge
c) The M4 between Hammersmith and Reading
d) The Peage between Calais and Baupume

3) What was the Automobile Association originally formed for?

a) To teach ex-servicemen to salute at motorists
b) To hamper the police by warning of speed traps
c) To cause confusion with Alcoholics Anonymous
d) To repair members cars at the roadside

4) Using *AutoRoute,* how many miles is it from Dover to Bath? (Catch question. If you get this right you've already got it so you don't win the prize)

a) 214 miles
b) 224 miles
c) 204 miles
d) 194 miles

5) Which software company has the address: Unit 18, Central Trading Estate, Staines, Middlesex TW18 4XE and the telephone number 0784 460077.

a) Gremlin Graphics
b) Borland UK
c) NextBase
d) Holiday Home for Pets Pie Company

Autoroute will run on any PC or compatible or any ST. Don't forget to tell us which one you want so that we can tell the nice chaps at NextBase. If you don't win, you'll just have to look elsewhere on the page for NextBase's number and dig out your wallet. ■

Fill in your answers to the questions, write out your name and address and stick this coupon on the back of an postcard. Then send it to: Tell Me The Way To Go Home Competition, New Computer Express, 30 Monmouth Street, Bath BA1 2BW.

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- ★ ***Mass storage:*** credit card sized memory cards (32K or 64K or 128K RAM).
- ★ ***Display:*** Graphics LCD, supertwist technology, MDA compatible, 40 columns x 8 lines, 240 x 64 pixels (with the option to window a full 80 x 25 character display). Keyboard controlled contrast.
- ★ ***Peripherals:*** 60 pin expansion BUS to take serial and parallel ports and memory expansion units.
- ★ ***Size:*** 8" x 4" x 1" (200mm x 105mm x 29mm).
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In addition to the excellent software built-in to the Portfolio Free of Charge (see right), other software and peripheral products, such as the sophisticated Pocket Finance package and serial/centronics interfaces are available. And it doesn't stop there. Many manufacturers have recognised the potential of the Portfolio and have already started to design new peripherals and software. Products currently under development include: Serial interface with built in mini modem, Apple Macintosh interface, business, utility and programming software plus a range of adventure and battle strategy games. For further free details on the Portfolio range, fill in the coupon below and return it to Silica Systems now.

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The Portfolio's built-in text processor program includes word wrap, line and column count, string search, in fact most of the functions you would find in a word processor. It handles printer and word processor control codes and allows easy transfer of files between Portfolio and your desktop PC.

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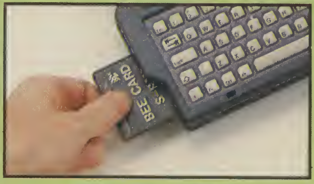

MEMORY CARDS

Portfolio can store and retrieve data and programs from its own RAM, or from small credit card size memory cards, that slot into its built-in card drive. The cards are available in three sizes, 32K, 64K and 128K, so you can carry a library of data in your pocket. The card drive also accepts ROM cards, which can contain commercial or custom software.

POWER SUPPLY

Portfolio is powered by three AA batteries which will run for up to six weeks with normal use, or from the mains using an adaptor. All the peripherals take their power from the Portfolio, so no extra batteries or adaptors are required. A 'battery-low' warning and memory back-up ensure that information is not lost when the batteries are changed.

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